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Contractors and Engineers Monthly

Vol. 45, No. 11 NOVEMBER, 1948 $3 a Year, 50 Cents a Copy

NOV 24 1948

Covering the Field

Road Maintenance Headaches
Smooth-riding highways despite 84-inch snowfall is North Dakota's problem. The story is told on this page.
Just how much are highway maintenance costs increasing? The article on page 72 answers.

Sets Levee-Building Record
Newcomer construction outfit builds levees in jig time—amazing old hands at game. How is it done? Page 1 tells you.

New Slant in Bridge-Building
Gantry crane, out of natural habitat, used on bridge-building job. On page 2 is the account of a contractor's ingenuity.

Giant Bomber Shelter Begun
Read, on page 6, about the hangar that is going to house six B-29's at once. See, on pages 58-59, the project on its way.

Route Gets Concrete Paving
What used to be 11 miles of gravel road, now is modern concrete highway. The job is described on page 18.

New Docks for Growing Port
Marginal docks will play big part in absorption of increased ship traffic. Construction details are on page 23.

Road Experts Get Together
The progress of our highway program must be stepped up. A 6-point program was proposed at the annual AASHO meeting. See page 30.

Bituminous Topping
Low-cost tar-mulch pavement for New York's Allegany State Park. See page 33.
Road rejuvenated with asphaltic concrete from continuous-mix plant. On page 61.

County Crew's Lot Unhappy One
Turn to page 40 for the story on how a northern-county maintenance crew keeps a highway system functioning every winter.

Trouble Dogs Channel Job
Entrapped gas just one problem on Houston Ship Channel job. Page 51 tells you how difficulties were tackled.

Seed Purchase for Roadsides
On page 68 is New York State's story on grass-seed purchase, specifications, and sowing for her highways.

Forewarned Is Forearmed
Heed sage advice on how to cut job accident losses in time, money, and lives. It's everyone's business. Page 70.

Nine Miles of Danger Gone
Maine eliminates a succession of hills, sharp curves, and narrow pavement. Page 77 carries this report.

Maps for Road Builders
An engineer of road design classifies the maps which will speed your work in routing and locating roads. On page 83.

Olympus Dam Another Link
Follow, with CONTRACTORS & ENGINEERS MONTHLY, the progress of the Colorado-Big Thompson job. Page 86 brings you the most recent development.

Engineering Has a Human Side
What capabilities do you look for in your key men? Page 102 discusses the point.

You will find "In This Issue" on page 4)

N. Dak. Highway Department Photo
When the going gets tough in North Dakota snow removal, a rotary Snogo and a heavy-duty V-plow work together. The rotary opens the drifts that are too much for the V-plow.

Levee Specialist Hurries New Job

Dirt Performance Soars As Ace Construction Co. Pushes New Omaha Urban Levee on Missouri River

✦ THE Ace Construction Co. of Omaha, one of the newest dirt-moving outfits of that region, is again setting a fireball pace on levee construction. Last year this outfit made old-timers sit up and take notice with its performance on the new agricultural levee at Hamburg, Iowa. This year Ace Construction Co. is repeating the performance, with improvements, on the new urban levee along the Missouri at Omaha, Nebr.

Involving about 447,000 cubic yards of embankment, 20,000 yards of excavation, and 17 structures in a distance of 3.6 miles, the new job is part of the comprehensive Pick-Sloan Plan for the development of the Missouri River basin. Ace's contract, in the amount of $509,000, is being administered under the supervision of the Omaha District Office of the Corps of Engineers.

Parker Erickson, Ace Construction Co.'s young, energetic President, says that no great effort has been made as yet to reach for record performance on the job. But Corps of Engineers surveyors have worked on the run to establish base lines and grades ahead of the fast-moving equipment fleet, and, in fact, Ace Construction Co. has its own engineer on the job to do some of the routine staking.

Flood History

Severe floods in the past have damaged Omaha's industrial section. The Pick-Sloan Plan will correct this condition with a system of dams and protective works, designed on a broad basin-wide basis, of which the present contract is a part. The cross section and height of the new levee are so designed that 250,000 cfs of Missouri River water will pass safely, with 5 feet of freeboard to spare.

Thus homes, small farms, factories, the Omaha Stockyards, and the

(Continued on page 14)

Winter Snow Fight Keeps Roads Clear

Snowfall of 84 Inches, Driven by Stinging Wind, Fails to Stop Equipment Or Men in Prairie State

✦ LAST winter, 84.3 inches of snow fell at Grafton, N. Dak., and temperatures plunged to 30 below zero. Throughout the state, snowfall and low temperatures were considerably worse than they had been for many years. But despite these extremely unfavorable conditions, snow fighters from the Highway Maintenance Department managed to keep the main highways and many of the secondary routes open.

How they managed is a story of a highway maintenance department used to facing a 5-month annual snow problem. It is a story of men and equipment watching over 6,508 miles of highways; of a low budget used to best advantage; and of a flexible, centrally controlled system of snow removal which shunted men and equipment around over the state as critical snow situations developed.

The great state of North Dakota, adjacent to the Canadian boundary, is usually thought of in terms of its agricultural potential. The immediate reasons for clear highways in winter are obvious: to let the farmers in and out of town, to permit them to haul feed and supplies, to let their children go to school, or to take their families to church on Sunday. But a broader concept of snow-removal work is explained simply by Ray Robinson, top-notch Maintenance Engineer of the North Dakota State Highway Department, in these words:

"It's nothing more than a public service we are expected to render."

The goal each winter is to keep all state highways open, the secondary as well as the primary routes. Last winter the situation got so bad that every available piece of equipment was working pretty much on a 24-hour basis; and, even at that, some secondary routes had to be neglected for many days until storms and wind subsided.

The State Highway System

Running generally east-west and north-south in the state are 6,508 miles of primary and secondary highways, serving residents of North Dakota and transcontinental tourists who use U. S. 2 and U. S. 10 mostly during the summer vacation season. Broken down by types, the system is comprised of the following mileages:

Portland-cement concrete	56 miles
Asphaltic concrete	66 miles
Bituminous concrete	6 miles
Tarvia	16 miles
Oiled road-mixed mats	1,226 miles
Oil surface treatment	589 miles
Gravel, drained and graded	4,449 miles
Graded earth	99 miles
Miscellaneous	1 mile

In the past history of the North Dakota State Highway Department, roads had to be built as economically as possible. Present-day results of this program are narrow right-of-ways, 20 and 22-foot highways, curves, fence lines, and other such impediments to a snow-removal program.

In the past five years, however, the State has moved rapidly to modern construction standards. Cross sections now are streamlined and embankments set slightly above the general level of the surrounding prairies. Studies made on this type of construction have proved beyond all doubt that snow-removal

(Continued on page 93)

COLORADO-BIG THOMPSON PROJECT—KEY LINK

C. & E. M. Photo
Olympus Dam, a 2,000-foot earth-and-concrete barrier, will dam the Big Thompson River near Estes Park, Colo., and draw off 550 cfs of water for irrigation. Its concrete portion is seen here from high up on the right abutment. (See article on page 86.)

Concrete-Bent Bridge Is Built With Gantry

Novel Rig Picks Up and Drives Piles; Handles Concrete in Pouring Caps, Girders, and Deck

By WILLIAM H. QUIRK,
Eastern Editor

✦ FITTING equipment to the job problem encountered, the Noonan Construction Co. of Pensacola, Fla., has been constructing a 710-foot bridge over the Perdido River with the use of a gantry commonly associated with shipyards. This big, timber gantry, powered by compressed air, not only handled and drove the concrete piles for the bents, but also handled the reinforcing steel and concrete in pouring the caps, girders, and deck slab. The bridge is being built under a $169,888 contract with the State Road Department of Florida, and is scheduled for completion this autumn.

Located in Escambia County, 17 miles west of Pensacola, the new bridge carries U. S. 90 over the Perdido River into the neighboring state of Alabama. As the boundary line is on the right or west bank of the river, the Florida contract spans the crossing completely, and extends well up on the opposite shore. From there the Alabama State Highway Department is continuing the project westward in a general reconstruction of U. S. 90 at this point over new location entirely.

The old bridge, 100 feet to the north of the new structure, is a 697-foot timber trestle with a 20-foot plank roadway. It is over 20 years old, and its four-pile bents required considerable maintenance. Traffic is using the old span until the new bridge is finished, at which time the old timber structure will be demolished.

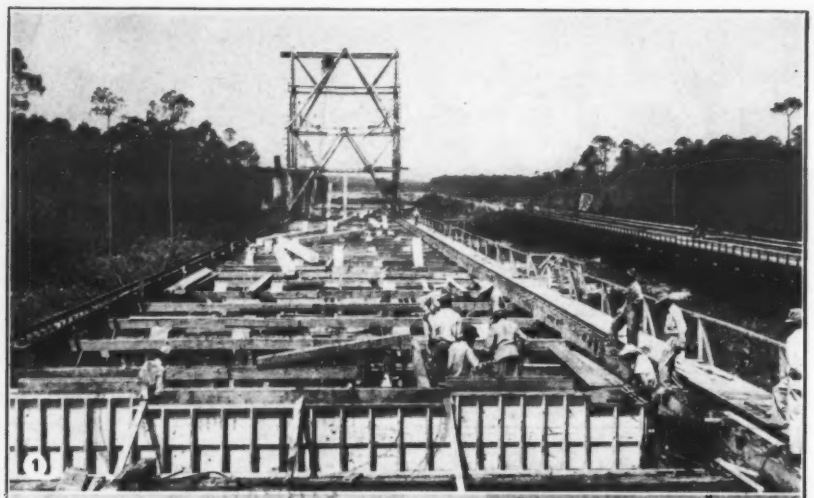
Bridge

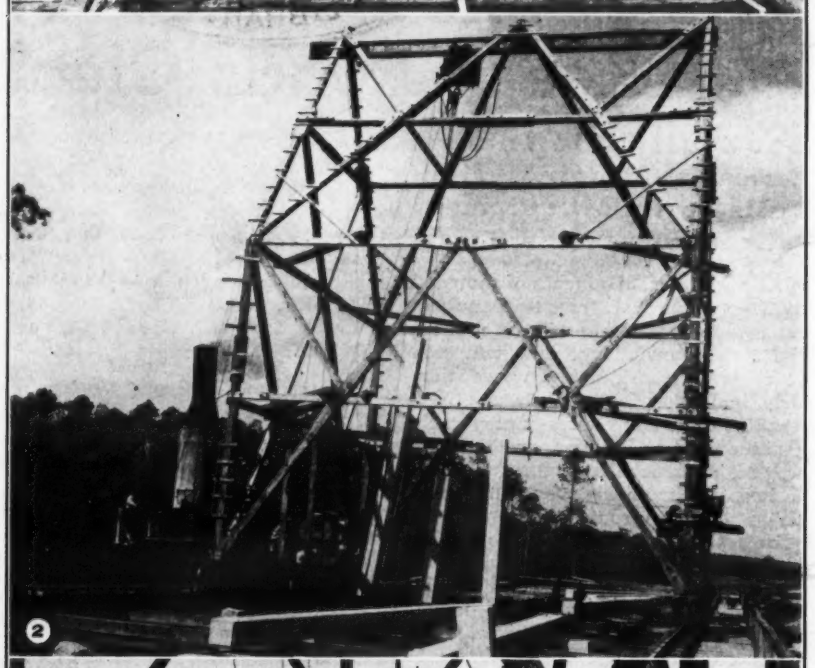
The new bridge consists of eighteen 36-foot concrete deck-girder spans, and one 62-foot steel I-beam concrete-deck span supported by precast concrete piling. The piles are 18 inches square and from 50 to 60 feet long; they are reinforced with eight ⅞-inch round rods tied together with hoop wire. The 50-foot piles weigh approximately 8½ tons, and the 60-foot piles weigh slightly over 10 tons. They were driven in five-pile bents on 6-foot 11-inch centers, with the center pile plumb, the adjoining two on a batter of ¾ inch to the foot, and the two outer piles on a batter of 1½ inches to the foot.

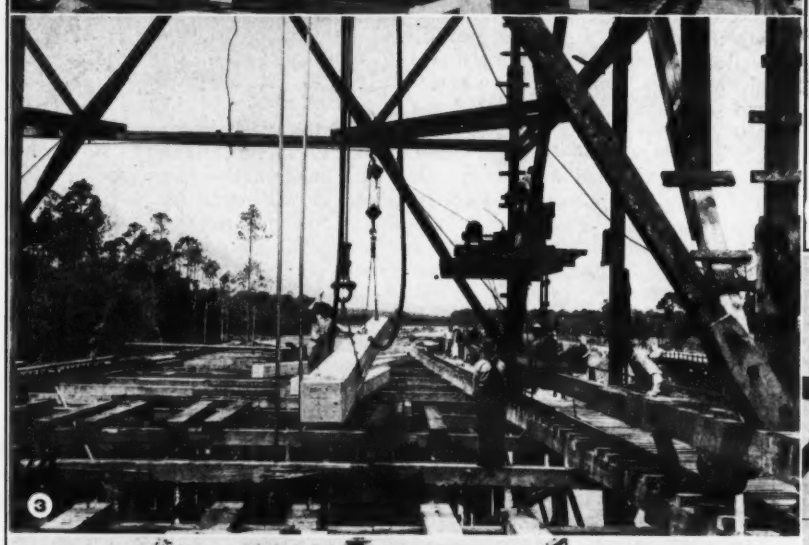
The bents were numbered from the west to the east. Bents 5 and 6, on either side of the 20-foot-deep channel, are nine-pile bents because of the longer span at this point. Bent 13 is also a tower, or nine-pile, bent in order to strengthen the structure at the midpoint between the east bank and the channel. The tower bents at the channel are protected by timber fender piles, but still provide a minimum horizontal clearance of 50 feet. The direction of pile batter in bents 1, 5, 6, 13, and 20 is parallel to the longitudinal axis of the bridge.

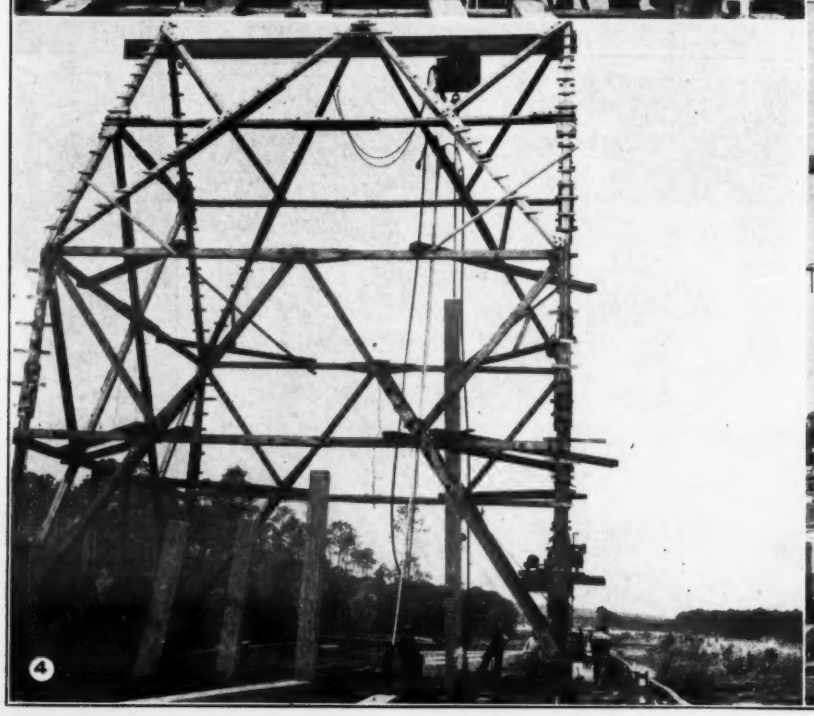
Concrete caps over the piles are 32 feet long x 2½ feet deep x 3 feet wide in the intermediate bents, and 3 feet 4 inches wide in the tower bents. The piles project 12 inches into the caps. At the channel span the steel I-beams

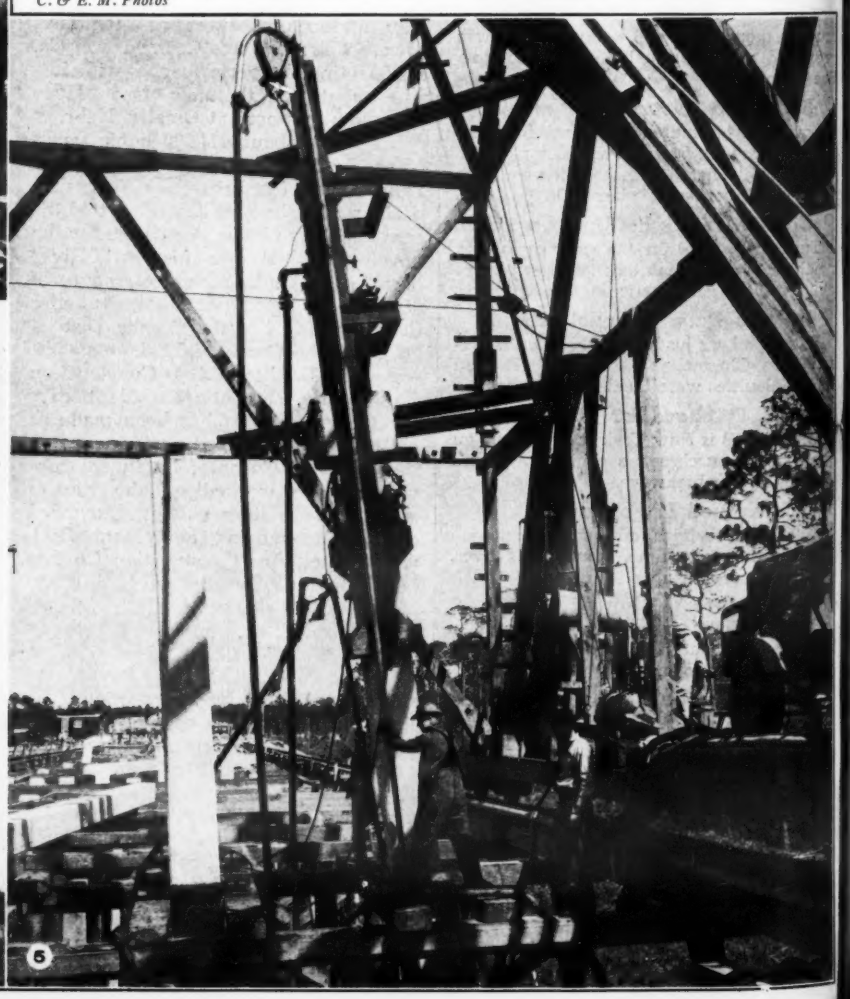
(*Continued on page 44*)









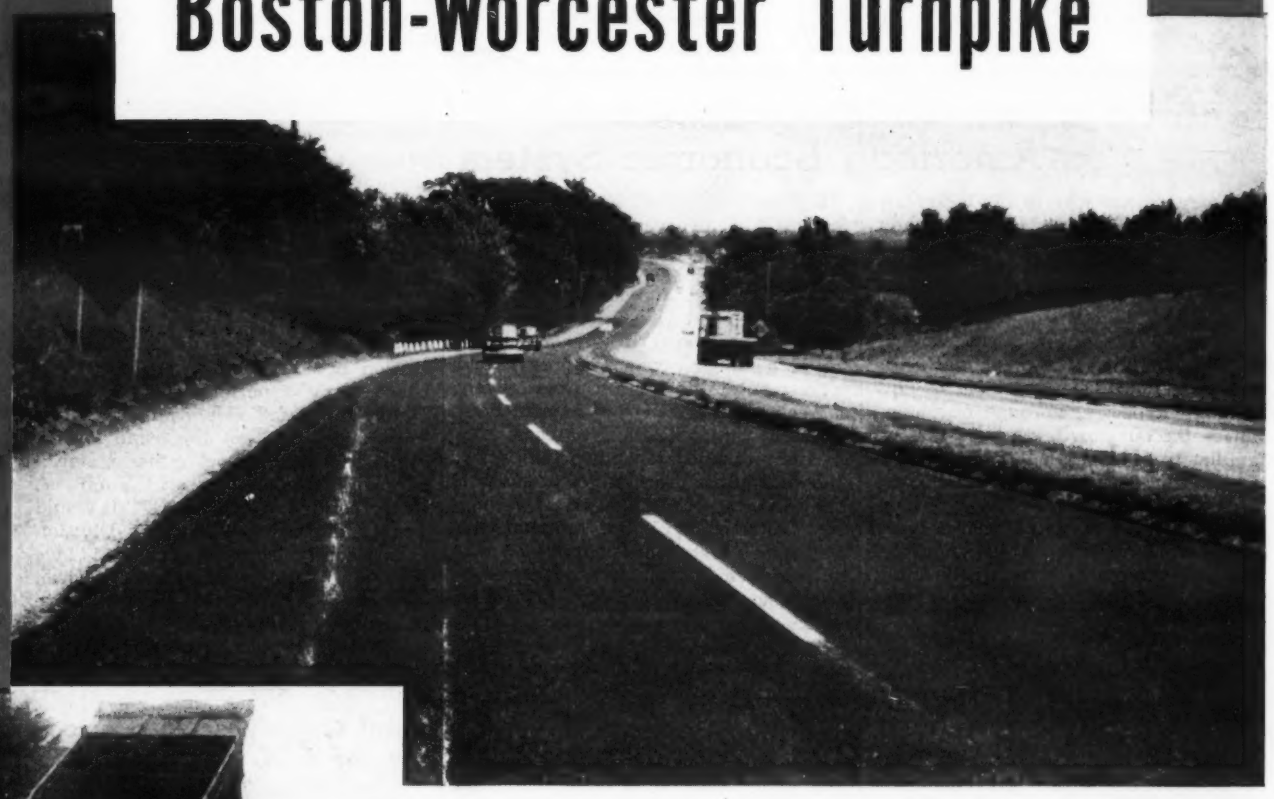


Noonan Construction Co. used this timber gantry to handle and drive concrete piles for the new 710-foot bridge over the Perdido River in Florida. View 1 shows it in the background, with the old bridge at right. View 2 is a close-up, showing the boiler at left. In photo 3, the gantry picks up a pile at three points—the two lower points by a Tulsa hoist driven by a Wisconsin gasoline engine; the upper point by a Beebe 15-ton hoist driven by an I-R air motor. In photo 4, the load is shifted entirely to the 15-ton hoist as the pile is suspended vertically by the 2-inch steel pin through its center. And in photo 5, a Vulcan No. 1 steam hammer drives the concrete pile.

C. & E. M. Photos

Massachusetts lays Texaco Asphaltic Concrete on another *major American highway*

Boston-Worcester Turnpike



(large photo) Resilient, joint-free Texaco Asphaltic Concrete on left side of Turnpike; old pavement, about to be resurfaced, on the other side.

(small photos) First and second courses of new Texaco Asphaltic Concrete surface, being laid by National Contractors Company, Inc., Somerville, Mass.

The Boston-Worcester Turnpike is, without doubt, one of the country's major highways. It connects the two largest cities of Massachusetts. Moreover, it carries much of the motor freight traffic moving between New York City and Boston.

This year, the state decided something must be done about the old concrete pavement at the Worcester end of the Turnpike. The type of improvement now being used is the same one employed widely and effectively by road builders for over a quarter-century. A resilient, heavy-duty Texaco Asphaltic Concrete wearing surface, constructed in two courses with a combined thickness of three inches, is being laid over the worn concrete.

The easy-riding, joint-free qualities of the new asphalt pavement will win the approval of Turnpike traffic. Also of interest to Massachusetts and other highway officials are the durability and low maintenance cost of Asphaltic Concrete, so conclusively demonstrated by past performance.

For your copy of a helpful booklet, which describes Asphaltic Concrete and the other Plant-mixed Types of Texaco Asphalt paving, write our nearest office.

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REG. T. M.

TEXACO ASPHALT

Contractors and Engineers Monthly

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For the Highway and Heavy-Construction Industry

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Ignorance—the Greatest Threat To American Economic System

The American way of life is gravely threatened, by Americans—by their very ignorance of the economic system which underlies it.

That unique system has brought more happiness and well-being to more people than any other the world has ever known. Yet many of us haven't the faintest notion of how it works or how to make it better. Through our ignorance—the outgrowth, perhaps, of long familiarity and taking it for granted—we magnify its imperfections and close our eyes to its benefits.

Up to now, there have been no very serious consequences of our ignorance. But today, the whole world is debating the claims of a rival way of life, and we cannot afford to stay ignorant. It is imperative that we understand—and so, appreciate—our economic system.

Recognizing that need, a number of public-minded businessmen recently prepared a program for informing Americans about the American economic system, and an economic platform on which all groups in American life could stand together. They then turned to The Advertising Council to help in their campaign of education.

The Council is a non-profit public-service organization which evolved from the War Advertising Council and which now handles such campaigns as the purchase of U. S. Savings Bonds, the prevention of forest fires, the program for highway safety, etc. Its Public Policy Committee, which represents all facets of American life, reviewed the program for economic education and suggested some revisions.

The final platform marks, to the best of our knowledge, the first time in history that representatives of all classes of citizens—management, labor, education, religion, and social service—have gotten together on an economic credo. Its ten basic points are these:

1. Freedom of the individual to work in the callings and the localities of his choice.
2. Freedom of the individual to contract about his affairs.
3. Freedom of the individual owner of property to start and manage an enterprise, to invent and profit, to invest, to buy and sell in a free market—insofar as this freedom does not conflict with the public interest.
4. Freedom of the individual to speak, to inquire, and to discuss.
5. Protection for the individual—by public or private means—against the basic hazards of existence over which he may have no control.
6. Government action in economic affairs when necessary to insure national security or to undertake socially desirable projects when private interests prove inadequate to conduct them.
7. Freest possible competition consistent with the public welfare.
8. Free collective bargaining—the right of labor to organize and to bargain collectively with employers.
9. Expanding productivity as a national necessity. American experience has proved that it is in the long-run interest of all: (a) to pay labor progressively higher wages in relation to prices; (b) to do this by progressively increasing productivity per man-hour through the application of constantly greater mechanization, power, efficiency, and skill in the processes of production and distribution; and (c) to reduce hours of labor and improve real income while increasing the volume of production and distribution.
10. Increased recognition of human values as a prerequisite to better living.

These ten points, it was agreed, describe the essence of the American economic system—what it has been, what it is becoming, and its constant goal of better living for all. Therefore, if we would combat ignorance—our own and others'—we must understand and make it understood that better living is achieved by higher productivity and wider distribution of its benefits; that free collective bargaining is essential to our system; that economic freedom and political freedom are dependent upon each other; and that with management, labor, and the public working together, everyone may come to enjoy fully all the best our system offers.

This is a job for everybody. And this is how *you* can help. First, be sure you understand the full implications of our American economic system. Be prepared to defend it with facts, for rival ideologies flourish in a vacuum of information. If we fill this vacuum with accurate facts about how our system works, what it has done for us, and above all what it can do in the future, we are thwarting the "isms" which threaten American democracy.

To be even more specific about how you can help—you will see in this and other magazines during the coming year advertisements planned to tell the story of the American economic system. Post these on your bulletin boards, to be sure none of your employees miss them. Also, you can distribute copies of the booklet "The Miracle of America" throughout your information. (Just write to us for them.)

And last and most important—you can help by conducting your own business on the highest level of productivity, efficiency, service, and regard for employee and public welfare. For one of the best ways to "sell" American democracy at home and abroad is to demonstrate how well it works. The American economic system is a vital part of American democracy and American living. The better we make it, the better and stronger and more impregnable our democracy will be.

Day Labor Would Up Cost of Airport Work

Uncle Sam is strongly opposed to "buying a pig in a poke" in his big Federal-Aid airport-development program. And to prevent it, Civil Aeronautics Administration regulations strictly forbid airport construction through the use of local airport sponsors' force account, unless it is first determined that using day labor can be more effective and more economical than employing the contract system and closely supervising all contracts.

According to a report prepared by the Airport Division of the American Road Builders' Association, the use of day labor for airport construction would likely up costs considerably. Advocates of the day-labor method have attempted in the past to make the point that highway work differs from airport work. But a breakdown of airport construction costs by the CAA shows that clearing, grubbing, drainage, and paving operations account for 90 per cent of the expenditures. The ARBA points out that these same operations constitute the major cost involved in developing highways.

Experience in road building reveals, says the ARBA, that work done by contract under strict engineering supervision will effect economies. The Commissioner of the Public Roads Administration, in testifying before Congress on the results of experiments conducted by Public Works officials, said, ". . . it is very difficult to get the same loyalty and performance from either material suppliers or employees on the job . . . as the contractor can secure". It would appear obvious, the Airport Division report concludes, that competitive methods requiring the use of modern equipment and materials are far more effective than day-labor methods and hand tools in accomplishing airport as well as highway development.

Joint Committee Is Formed By the AGC and the ASCE

A National Joint Committee has been established by the American Society of Civil Engineers and The Associated General Contractors of America, Inc. It will study matters of concern to civil engineers, general contractors, and the public, with a particular view to recommending procedures for carrying out construction more economically. The committee will be composed of six members—three from each society. It will not in any way supersede or interfere with the objectives or activities of existing committees of either society.

Among the subjects to be studied are these: standard contract clauses for engineering construction, clearly understandable by engineers and contractors; clear and definite specifications; design which can obtain maximum benefits from mechanized construction operations; equitable and clearly understandable bidding and awarding procedures for engineering construction; and construction courses in engineering colleges to train men for construction. It will also study ways to make the construction and designing of public works attractive to young engineers.

Call for P-1 Engineers

An examination for filling engineer positions at the P-1 grade has been announced by the U. S. Civil Service Commission. These positions are located in Washington, D. C.; Alexandria, Va.; Arlington County, Va.; and Montgomery and Prince Georges Counties, Md. The salary is $2,974 a year.

No written test is required. Necessary qualifications are: (a) 4 years of college study in professional engineering leading to a bachelor's degree; (b) 4 years of progressive experience in technical engineering; or (c) a time-equivalent combination of (a) and (b). Applications will be accepted from students who expect to complete their college courses within 6 months of the date of filing applications. Age limits, waived for persons entitled to veteran preference, are from 18 to 35 years.

Interested persons may obtain information and application forms at most first and second-class post offices, from Civil Service regional offices, or from the U. S. Civil Service Commission, Washington 25, D. C. Applications—which will be accepted until further notice—should be sent to the Commission's Washington office.

In This Issue

Airports	6, 58, 59
Book Reviews	5, 106
Bituminous Paving	33, 61
Bridge Construction	2, 77
Building Construction	6, 38, 58, 59
Channel Work	51
Concrete Paving	18
Convention Calendar	49
Convention Report	30
County Road Work	40, 105
Dam Construction	86
Distributor Doings	75
Dock Construction	23
Dredging	51
Editorial	4
Highway Grading	77
Highway Maintenance	1, 72
Human Engineering	102
Legal Decisions	91, 92
Levee Construction	1
Road Mapping	83
Roadside Development	68
Safety	38, 70
Snow Removal	1

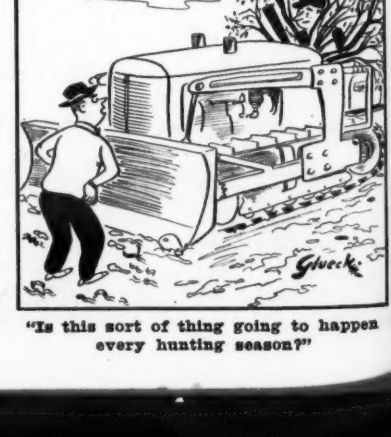
Land Acquisition, Control: Practices and Techniques

A report on land acquisition and control of highway access and adjacent areas has been issued by the Highway Research Board of the National Research Council. Bulletin No. 10, 1948, contains ten committee memoranda and four special papers which were presented at the 27th annual meeting of the HRB.

This 42-page bulletin opens with a report prepared by David R. Levin, Chairman of the Committee, in which he discusses current problems and legal techniques, public information, organization of interested groups, and other administrative and practical problems connected with this type of project.

The bulletin also contains the following papers: "A Planner's View of Express Highways", by Paul Oppermann, Urban Planning Officer of the Federal Works Agency; "State Administration of the Highway Right-of-Way Function", by G. E. Strauss, Right-of-Way Engineer of the Ohio Department of Highways; "Housing Development and Express Highways", by Earl Von Storch, Urban Studies Director, Housing and Home-Finance Agency; and "Estimating Damage Caused by Loss of Access Rights", by Frank K. Wall, Appraiser, Public Roads Administration.

Copies of the bulletin can be obtained by writing to the Council's publication office at 2101 Constitution Ave., N. W., Washington 25, D. C. Cost of the book is 60 cents per copy.



"Is this sort of thing going to happen every hunting season?"

Va. Department Prepares Booklet on Its Road Work

The people of Virginia—particularly the high-school kids—are learning about their Highway Department through an interesting 50-page booklet called "Toward a Greater Virginia". They are finding out about the highway needs of their state, the set-up of the Department, the steps in building and maintaining a road, and the way the whole operation is financed. Pictures or charts on every page, plus highly readable text, make the booklet an excellent tool for public relations and education; it is particularly adapted for use as supplementary reading in high-school social-studies classes.

The first part of the booklet covers these topics, in about this order: the importance to Virginia of her highways, the deficiencies of those highways and the 20-year plan to correct them, the organization of the Highway Department. It then goes on to explain how roads are located and designed; how soils and materials receive preliminary study; how right-of-way is obtained; how the actual construction job is contracted for, supervised, and inspected; how maintenance takes over; and how the roadside-development program operates. The last section discusses equipment and purchasing, financing, costs and cost accounting, and lists the total highway mileage in the state by districts and residencies.

A limited number of extra copies of the pamphlet are available for distribution on request to the News Bureau, Virginia Department of Highways, Richmond, Va.

Booklet Summarizes Ohio 7th Roadside Conference

The proceedings of the Ohio Seventh Short Course on Roadside Development have been printed and are now available in a paper-bound booklet. The yearly conference is sponsored by the Ohio State University with the cooperation of the Ohio Department of Highways, and the 1948 meeting took place February 11 and 12 in Columbus.

The papers appear in the bulletin in the order in which they were presented, with accompanying diagrams and tables. Those during the first day's session on highway planning, safety, and maintenance, included "Planning the Highway Program" by R. E. Jorgensen, Connecticut Deputy Highway Commissioner; "The Place of Highway Cross Section Design and Development in the Problem of Road Safety" by Wilbur H. Simonson, Chief, Roadside Section, Public Roads Administration; "The Latest Developments in Weed Control With Chemicals" by C. J. Willard of Ohio State University; and a paper given in the evening on planning, zoning, and public relations.

Papers presented the second day dealt with landscape design, the layman's and conservationist's approach to roadside development, and the training of tree-pruning personnel. The final session was devoted to practical roadside problems and their solution. The panel discussion which was held on the subject is reprinted in the bulletin, along with Professor F. J. Salter's paper on fertilizers, limes, and mulches. The booklet also includes the registration list of the conference.

Copies can be secured at no cost by writing to Prof. Chas. R. Sutton, Dept. of Architecture and Landscape Architecture, Ohio State University, Columbus 10, Ohio, or Dallas D. Dupré, Jr., Landscape Architect, Ohio Department of Highways, Columbus 15, Ohio.

Highway Engineering

A volume entitled "Introduction to Highway Engineering" has been published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. It aims to present in easy-to-read form the fundamental principles and processes involved in highway engineering. The book was prepared by John H. Bateman, Professor of Civil Engineering at Louisiana State University. This is the fifth edition of the book, which was first published in 1928.

Professor Bateman covers all phases of highway work in this book. He describes soils, drainage, highway design, earth-moving operations, bituminous materials, design of flexible pavements, bituminous and soil-stabilized surfaces, design of concrete pavements, sheet and rock-asphalt pavements, maintenance, surveys, highway planning, highway financing, highway administration, and other subjects having a bearing on highway engineering. The appendices cover the determination of street-intersection elevations; tables for determining volumes of earth work; and a series of problems and questions on the material covered in the book. "Introduction to Highway Engineering" sells for $5.50.

Welding Text Earns Award

A joint award of $5,000 has been made to Professor C. D. Williams of the University of Florida and Professor E. C. Harris of Fenn College, by the Trustees of The James F. Lincoln Arc Welding Foundation. The award was granted for their co-authorship of "Structural Design in Metals", a textbook manuscript entered in the Foundation's textbook award program. It was selected as the best modern textbook manuscript in the structural-engineering field. The book is to be published by the Irwin-Farnham Publishing Co. of Chicago, Ill.

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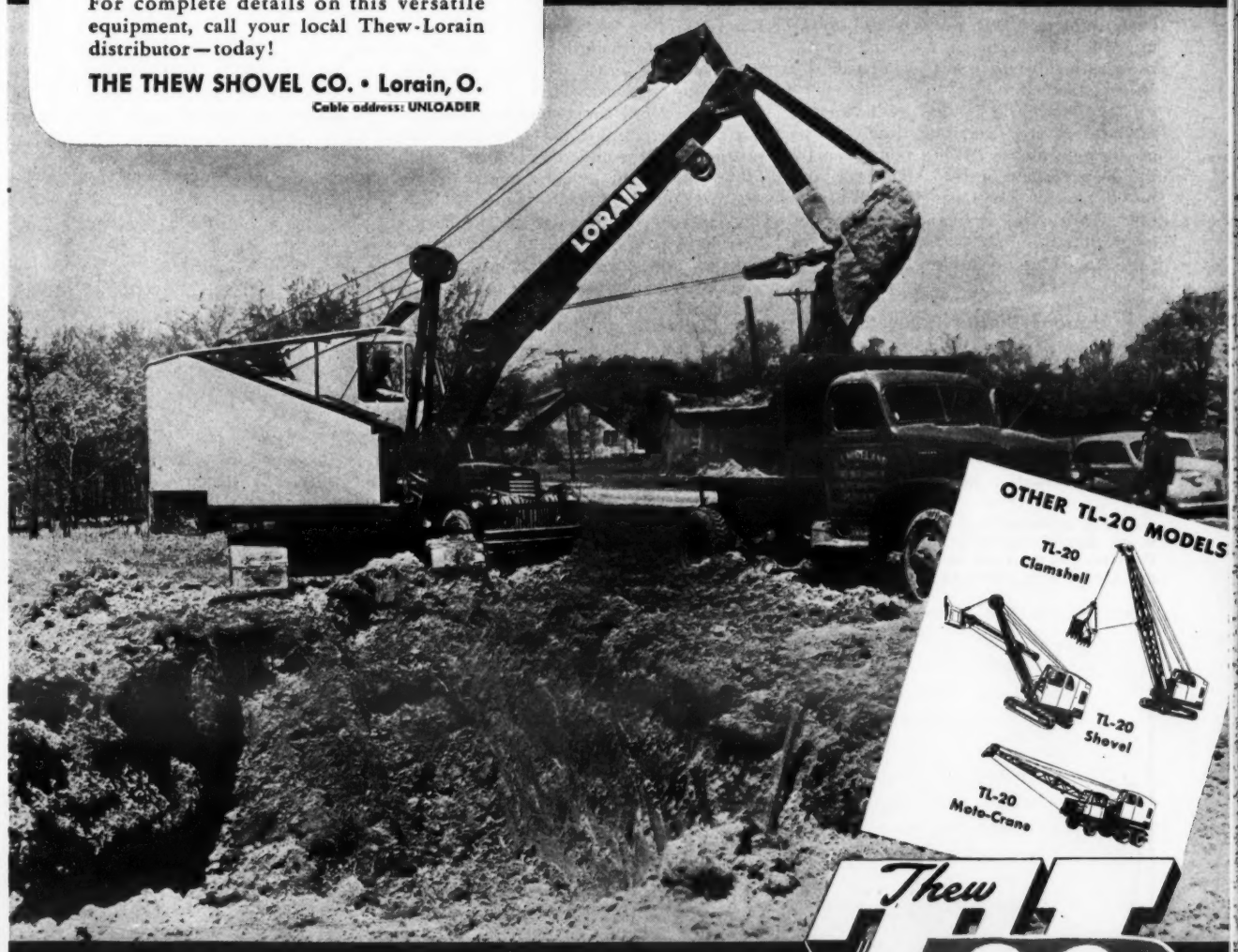

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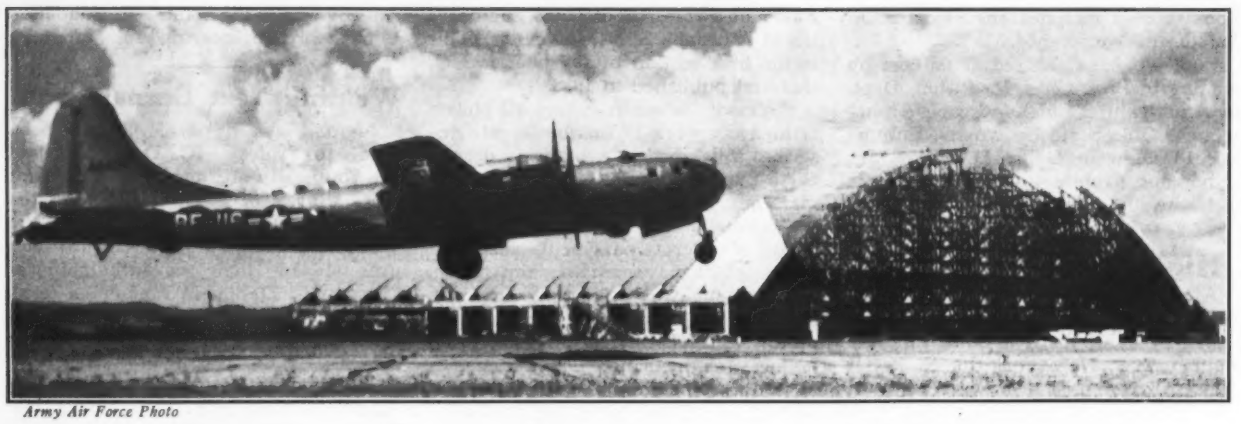


Army Air Force Photo

Big-Bomber Repair Hangar Sets New World Size Record

Largest Airplane Hangar Of Monolithic Concrete Has 340-Foot Clear Span Under Z-D Shell Roof

By RAYMOND P. DAY,
Western Editor

(*Photos on pages* 58 *and* 59)

✦ A HEAVY-bomber repair hangar with a clear span as large as two football fields under its Z-D shell-type roof is currently under construction at the Rapid City Army Air Base near Rapid City, S. Dak. According to engineers of the Army, it is the biggest hangar of its type ever built. The vast 102,000-square-foot floor space is covered with a big reinforced-concrete shell roof with 340 feet of clear span across the building at its base.

Steenberg Construction Co. of St. Paul, Minn., is handling the project under a $1,665,000 contract with the Omaha District Office of the Corps of Engineers. Started August 25, 1947, the job was slowed to some extent by a hangar location change which involved design extras. But work is now moving rapidly, and the big building should be ready for its giant occupants by March, 1949.

Completed, the hangar will accommodate six B-29's at one time, or two of the very heavy B-36's now used by the Department of the Air Force and based at this northern United States field. A similar hangar is also under construction, on a cost-plus basis, at Limestone, Maine, under Army supervision.

Hangar Design Interesting

The big hangar was designed by the Roberts & Schaefer Co. of Chicago. This engineering firm followed the Z-D cylindrical-shell system of roof construction first used on a permanent structure in this country in the autumn of 1934, when a hemispherical dome was built on the Hayden Planetarium in New York.

If properly designed, domed structures are economical and offer an optimum of resistance for a body built from a given quantity of material. All-metal airplanes themselves are really domed structures, the curved surfaces offering a multiple of strength of the original flat sheets of which they are made. Using the stiffness of curved surfaces for hangar construction is simply applying a principle of economical plane design to stationary buildings.

Because of its highly indeterminate form, this type of structure can sustain considerable damage in case of an accident and still prevent total collapse. The shell can also take considerable shock because of its shape and design which is similar to a pressure vessel. Even local fires of extreme heat will not cause failures in buildings of this type, because they have so many ways to carry the stresses. This is in contrast to conventional construction where the flat slabs are separated from the supporting frames, and do not brace each other in case of an emergency or are resistant only to gravity loads.

Concrete construction at the Rapid City hangar is designed to offer an attractive and permanent building, with low upkeep cost. In spite of the absence of trusses and inside bracing, the lateral stiffness of the building will be extremely high due to the monolithic interlocking action of all parts, slabs, framing and walls.

Air-entrained concrete with a design strength of 3,500 pounds at 28 days is used throughout the superstructure.

(*Continued on page* 98)

Tough Building Problems Solved as Contractors Form, Support, and Pour Gigantic Concrete Dome

✦ A RAW northeast wind ripped across the Rapid City Air Base, stinging with the tail end of last night's snowstorm. Holger Nielsen, Steenberg's General Superintendent, jumped out of his car and strode hastily through the snow, shivering as he buttoned his mackinaw collar.

A big, hulking man wearing heavy woolens and a Texas Stetson hat stood studying the top of a footing form barely sticking out of the snow.

Nielsen shouted, "Well, Bob, what do you think?"

Bob Smith, Concrete Superintendent on the job, slid a shot of tobacco juice neatly into the snow from between his teeth, barely moving his lips. "She's as messed up as a midshipman's sea bag, Holger," he responded glumly. "Seven feet of snow is drifted in that damn form. There's a mat of steel in the bottom. Pipes and conduits from hell to breakfast. There might even be an inspector under there, snowed in in his sleep and dreamin' the concrete crew's to blame for the snow last night." Smith grinned for a second, trying to extract a little humor from the situation.

The situation was as truly bad as it looked to both men. A big footing pour, made nearly ready the night before, was level-full with drifted snow. Chutes, concrete buggies, and other small equipment lay half buried. The wind howled dismally. Nielsen winced, thinking of the cost, to Smith's company, of laboriously cleaning out the snow before it melted.

Though hardly the greatest problem of the big hangar job at Rapid City Army Air Base, this one is indicative. It is in a class with the heavy spring rain and the painful shortage of local labor which plagued the project. Moreover, there were plenty of construction puzzles which confronted the men and almost defied solution. How to support a 600-yard concrete pour from underneath with falsework that had to reach 90 feet in the air: that was just one.

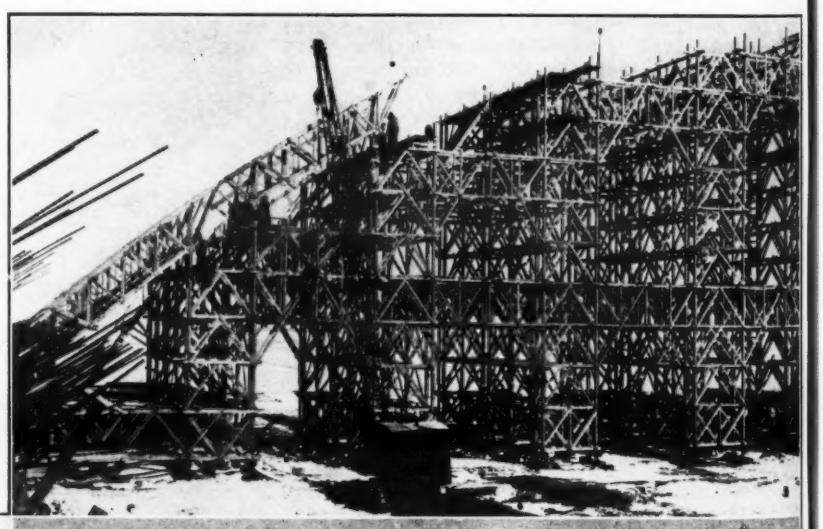
Excavation Begins

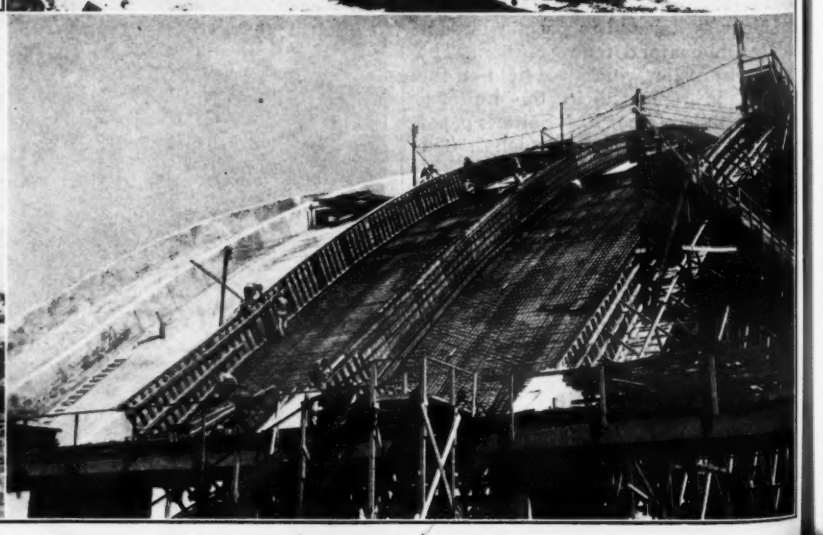
To start the job, Otto Ashbach & Sons moved men and equipment in to start the structure excavation. The first work to be done was the excavation of two 45-foot-wide cuts about 340 feet long on both sides of the hangar, to expose the foundation soil which was to receive the concrete bearing piles. The northerly of these cuts called for a 12-foot bank of dirt to be removed.

A Link-Belt Model LS-85 shovel with four dump trucks had been sent out to the job, and this equipment was put to work on one of the foundation cuts. The second cut was excavated with tractor equipment, using a new Caterpillar D8 and a 12-yard LeTourneau Carryall. While the north cut involved somewhat heavier yardage, it was dug by tractor equipment because of the short haul to a disposal area only 150 feet away from the hangar. The excavated dirt was used to bring up the general elevation around the hangar.

The entire center section inside the hangar was then leveled off by a Cater-

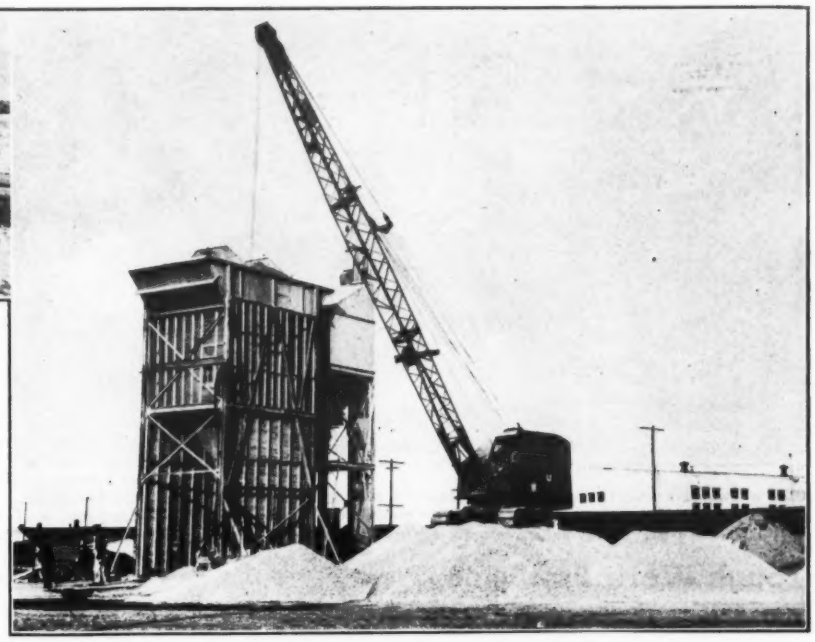
(*Continued on next page*)





Below, A Mixermobile delivers footing concrete for the hanger at Rapid City Air Base in South Dakota. At right, above, is a section of the timber scaffolding which Steenberg Construction Co. used to support the forms for roof pours. And at right below, workmen get a roof pour ready to go. Note the access bridges at right for the concrete buggies.

Army Air Force Photos



Army Air Force Photos

Tension ties, shown above in storage piles, were placed from footing to footing under the Rapid City Air Base hangar, to take horizontal thrust. At right is the Butler batching plant which subcontractor Rapid City Concrete Contractors, Inc., set up to handle the 15,000 cubic yards of concrete for the big building.

pillar No. 12 motor grader, cutting a few inches off here, filling a few inches there. Grade stakes were then set as a subgrade guide.

Later, after the first three roof sections were poured, the inside of the hangar was made ready for the floor slabs by bringing in granular pit-run 3-inch-minus material from the air-base gravel pit. This material went down in 6-inch lifts. The earth subgrade was sheepsfoot-rolled to 90 per cent of modified AASHO density, the lower gravel lifts were put in at 95, and specifications called for 100 per cent on the top lift of sub-base material.

A Case rubber-tired tractor and a single LaPlant-Choate sheepsfoot roller did most of the compaction work on earth and granular base. However, a pneumatic roller and an aged Austin smooth steel 3-wheel roller were also used.

Despite restricted working space, viscous wet top clay, and all the headaches which go with that kind of combination, Harold Angel and his Ashbach subcontracting crew managed to keep one jump ahead of carpenter and concrete crews.

Pile Driving

The 616 concrete and steel bearing piles were furnished and driven by the Raymond Concrete Pile Co. from its Kansas City headquarters. This work moved along at exceptionally good speed.

Timber cribbing was built up to carry the Raymond skid-rig pile driver which was used. The steel shells, ranging from 18 to 28 feet in length, were driven to a bearing value of from 45 to 100 tons by the Raymond steam pile hammer on the skid rig. Reinforcing and concrete were placed in the pile shells after they had been driven. The tops of the shells were also trimmed, prior to pouring, to coincide with elevations shown on the plans.

The Raymond Concrete Pile Co. crews moved so rapidly that they were in and out before many of the men were aware the job was nearly finished. The wide 45-foot cuts made initially by grading equipment gave plenty of tail-swing room and working space, probably contributing something to the speed with which the piles were driven.

Job Plans Changed

Originally, Nielsen had hoped to set up a pouring schedule which would have started some of the foundation work at this point, so he could do a roof pour very shortly, and bring up his doorway and floor-slab pours as he went along. But bad luck in the delivery timing of his roof supports forced him to go ahead and make all the foundation pours first. This was not bad at the time, of course, but it did tend to bunch the operations during the roof pours.

"Hell, we work steady by jerks like a frog walking!" cracked one concrete stiff after a particularly lean pay check.

Scaffolding Arrives

By mid-winter of 1947-48, the massive timber scaffolding, which was to support the roof sections and form work during the pours, arrived. Designed by Roberts & Schaefer Co., it was made up in pre-cut sections at Portland, Oreg., by Timber Structures, Inc.

The structure is a ring-and-bolted job, made of structural-grade Douglas fir. It consists basically of trusses which carry the concrete form, curved to

(*Continued on next page*)

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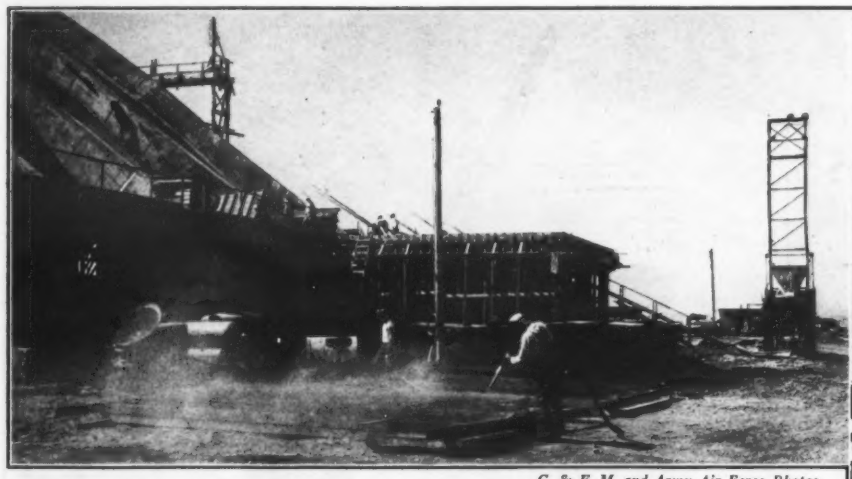

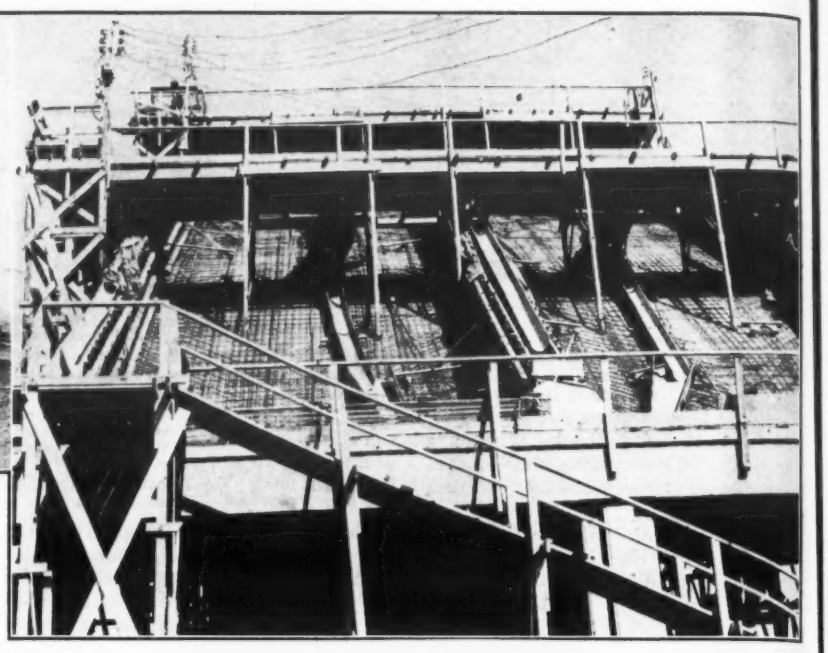

C. & E. M. and Army Air Force Photos

The workman above is sand-blasting steel wire-mesh reinforcing which will be placed in a roof pour on the hangar at Rapid City. The other photo shows reinforcing and chutes in place just before a pour begins on the second section of roof.

Tough Work Problems At Big Repair Hangar

(*Continued from preceding page*)

coincide with the shape of the roof. This trusswork rests in turn on twelve sets of upright piers. There are 176 upright timbers in these 12 piers, each one of which carries a 25-ton Simplex screw jack which permits the trusswork to be raised or lowered independently of the upright framework.

The 12 sections of upright members are, of course, bolted and braced together, and each section rides along on steel wheels and a single railroad rail. This is true, however, only during a move ahead. When a pour is made, the outrigger timbers outside the railroad rail are supported by six 4 x 4-foot timber pads set solidly on a sand leveling cushion.

The upright members of the scaffolding consist of 6 x 6 and 8 x 8 timbers, securely braced. All 12 upright piers are tied together to make a solid structure. When the structure is set for a pour, each pier rests on the big ground pads, with wooden wedges driven in to permit each pier to be set to exact grade. A pencil mark 3 feet above the floor line on each upright at each corner is set true to a surveyor's level. This, then, puts the Simplex jacks on top of the uprights in the proper position to raise and lower the trusswork a maximum of about 5 inches.

The support scaffolding was assembled during the winter months, at a total assembled cost to Steenberg of

(*Continued on next page*)

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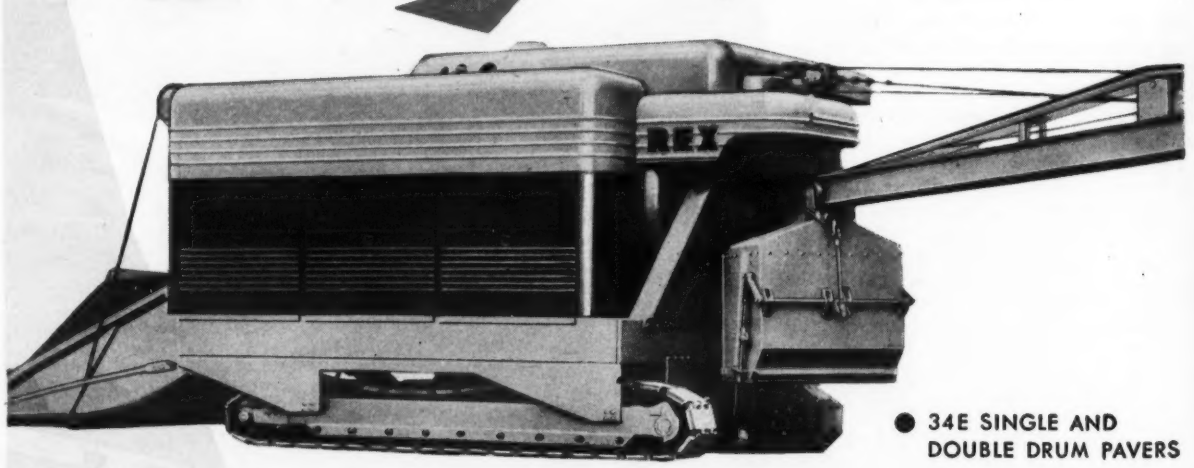

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CHAIN BELT COMPANY REX CONSTRUCTION MACHINERY

$150,000. Starting at the ground, the uprights and bracing progressed to each of their various top elevations. The trusswork was assembled in sections on the ground. These sections were hoisted by block and gin pole to their positions on top of the uprights.

The support scaffolding was designed with a short cantilevered section on each side of the building, to catch the edge of the pour at the start of operations. A field change had to be made to stiffen this part of the framework: knee braces were added between the bents and the edge of the form. Horizontal bracing was also added above the 28-foot level, and a steel shoe and some extra timber went in where the wheels under the bents ride along on the railroad rails.

The installation of access stairs and bridges for concrete buggies also helped a great deal to add stability to the structure. And where bolts pass through the various timbers, a large steel ring at the bolt head and the tightening nut prevents any twisting or warping of the members. The bolt is merely the tie; the large washer gives bearing.

The edges of the trusswork, at the bottom, are about 6 inches from the walls. This permits the trusswork to be lowered easily without binding. The top of the form work, which makes the face of the concrete ceiling in the big hangar, is covered with Masonite to insure a smooth, dense surface.

De-Centering Is Big Job

One of the most important jobs of all, in connection with the falsework, is de-centering after a pour is completed. The process has to be timed perfectly. As the big trusswork moves slowly down, the pull on the steel tension ties across the building has to be put on.

It is well known by many of the men on the job that on a hot day, after a pour is made, the concrete dome expands sufficiently to break bond with the form work. And conversely, cool weather during this period contracts the concrete and puts an added load on the falsework.

For practical purposes, however, the concrete forms stay in place until modulus-of-elasticity tests on test beams show a value of 2,000,000 pounds per square inch. This usually takes about seven days.

As the time for de-centering approaches, men move in with 80-ton Simplex jacks to break the skin friction between the ground and the steel tension tie bars. Where the turnbuckles are located, men have already dug the ground away to eliminate any possibility of friction at that point.

The tension nuts are then unscrewed about ¾ inch on one side of the building, to permit the rods to be pulled through the ground that far to insure their freedom of movement. A piece of steel H-beam is then fastened to two of the bars, the jack is set between the H-beam and the foundation concrete, and usually two of the rods are freed at one time. Some of the sticky clay ground sets up around the bars so hard that pulls of 28 to 30 tons per tie bar are often necessary before the tie bar is free. All the tie bars are freed, of course, before de-centering starts.

Army Air Force Photo

Finishing operations are under way here during the second roof placement.

On each side of the building there are 22 rows of jacks which support the trusswork. Twenty-two men are therefore needed, one man to each row of jacks. These men are stationed on the walkway at each row of jacks. They are responsible to their foreman who calls signals from high up on the form work.

In general, the process consists of stripping the form work from the top down towards each side, in six operations, and of putting the tension-tie load on the steel rods also in six increments to coincide with the de-centering, or stripping, operation. Exactly how and in what proportions that operation is to be done is usually detailed by Steenberg in a letter to the Army's Resident Engineer, Col. James L. Lewis.

De-centering operations begin at the very top, with only one-eighth turn on the jacks. The top form is then broken loose very gently down towards the sides by increasing the downward turns on the jacks to one-quarter turn, then one-half turn, and finally a full turn. As each of six separate downward movements occurs, the 80-ton jacks put 8 tons of strain on each of the tension ties. When de-centering is fin-

(Continued on next page)

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Tough Work Problems At Big Repair Hangar

(*Continued from preceding page*)

ished and the form is about 4½ inches below the concrete, each steel rod through the footings far below has 48½ tons of strain, and has actually been elongated about 3½ inches.

The only exception to this is at the ends of the form. At the ends of each pour, only half the outer rib is poured. Therefore only half the 48½ tons is put on when the form is stripped, and the other half is added when the next pour completes the rib.

As soon as the trusswork is all in the clear, men knock out the wooden wedges which hold the outrigger timbers up on pedestals on the bearing pads. This lets all the weight drop down on the railroad rail at each bent. The pads are then moved ahead for the next pour, rails are set, and the entire form is ready to move ahead.

Several schemes were tried in pulling the form ahead 50 feet. A dragline was first used, with its drag cable hooked to a cable bridle at each bent. This method was fairly successful, but Holger Neilsen felt that some improvement could be made by using a CMC hoisting engine instead of the crane. For the third de-centering move, he proposed the use of ordinary jack-type car movers at each bent, and it was believed that this method would be the most successful tried.

When the move is made, the bents are again blocked up on the bearing pads to grade, as checked by a surveyor's level. The Masonite form-work surfacing is cleaned, oiled, and repaired if necessary. A mat of 6 x 6-inch square mesh with ¼-inch wire is then installed ¾ inch from the form. Steel-bar reinforcement and embedded metal items then follow, and a second layer of mesh is placed within ¾ inch of the top of concrete. The form is carefully checked with surveyor's instruments, and measurements are made from floor reference points to the top of the pour before it is pronounced ready for concrete.

Concrete Pouring

Batching facilities for concrete consist of a Butler 70-ton aggregate and sand plant, and a 400-barrel Butler cement silo. Coarse rock aggregates are produced commercially at Rapid City by Pete Lien & Sons, and sent to the job by rail and by truck. Sand is secured from Oral, S. Dak., from Reitz & Crites, and is shipped by rail. Lehigh bulk portland cement comes by rail from Mason City, Iowa, and the portland cement for the floor will be produced locally by South Dakota Cement Co.

An imaginative newspaper reporter, writing about the job in his newspaper, explained the job was so important that a second stand-by plant was used in case the first one broke down.

Questioned about this second plant, which was nowhere in sight, Concrete Superintendent Bob Smith grinned and said, "You know, I been lookin' for that plant myself, and damn if I can find it. If I ever find it, probably Yehudi'll be runnin' it!"

As the concrete materials arrive at the plant, they are unloaded and separated into their respective locations. Cement is of course unloaded and stored in the bulk silo. Sand and aggregates are stockpiled near the batch plant by the clamshell which charges the plant hoppers.

Concrete is batched in 2 and 3-yard batches. On the big roof pours, 5-yard batches are sent to the job by the simple method of combining the 3 and 2-yard batches. Rex and Smith truck-mixers are used for the roof pours, and will very likely be used for floor pours later on. A Mixermobile has also been used with a great deal of success on the footing and short wall pours.

The concrete for pedestals, columns, arches, and curved roof slab is designed on the basis of 6.25 sacks of cement per cubic yard, and the batch weights for a 3-yard batch are as follows:

Rock aggregates	5,850 lbs.
Sand	3,708 lbs.
Water	105 gals.
Cement	1,764 lbs.
Darex AEA	0.25 to 2.0 oz. per sack

According to the men on the job, some interesting results have been obtained with the air-entraining agent in the mix. Field variations in the characteristics of the material from one shipment to another were such that quantities from ¼ to 2 ounces per sack had to be used to obtain 5 per cent of air entrainment. Also, while in theory the entrained air is supposed to make up some of the bulk of the batch, it did not work that way in practice.

"We have designed our mix for a calculated yield of 27 cubic feet, then added the air-entraining agent on top of that", said a Corps of Engineers technician in charge of concrete work. "There has been no measurable change in the yield of the batches as a result of adding air-entraining agent."

Use of Darex, however, did increase the workability of the concrete at low slump, and there was no appreciable drop in strength.

Roof Pours Are Hardest

Undoubtedly the six roof pours, made at intervals of about three weeks to a month, were the hardest on the job. And they were further complicated by the problem of labor. For example, only 17 finishers are registered in the local at Rapid City, and it required more than that for one of the pours. Once every three to four weeks, Nielsen had to find about 150 extra men, for only two days of work. Somehow the necessary help has been assembled, how-

(*Concluded on next page*)

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C.I.T. CORPORATION
NEW YORK CHICAGO ATLANTA SAN FRANCISCO LOS ANGELES
AFFILIATED WITH COMMERCIAL INVESTMENT TRUST INCORPORATED

ever, and the job is moving ahead.

To raise the concrete to the top of the building, two towers 110 feet high were built of doweled 2-inch pipe, all welded and braced. A Western Machinery Co. concrete bucket was installed in each tower. Each tower was set in place about 25 feet from the center line of the building.

A cross-bridge, one-third of the way up, permits concrete to be dumped to buggies and wheeled to the corresponding access platform on each side, at that level, to start the pour. The usual time for a concrete bucket to be raised to this level by the CMC hoist below is 15 seconds.

Another cross-bridge with access platforms is located about two-thirds of the way up, requiring about 30 seconds of hoisting time. Concrete goes to the top of the roof in 55 seconds.

Half the total concrete crew works each side from the bottom towards the top as a pour progresses. A general foreman and a ground foreman handle details common to both sides, and the concrete gang on each side is made up as follows:

1 concrete-placing foreman
1 concrete-finishing foreman
9 finishers
8 vibrator men
4 concrete-buggy men
1 buggy traffic manager
1 timekeeper
1 towerman (handles both sides)
3 concrete men on beams
8 chute handlers
4 muckers
1 sweeper
1 curing man

To start the concrete pour, the material is first put in the outside beams near the bottom, and vibrated until it oozes out the toe of the beam. Then the center beam and the base of the arch on either side start to take shape. On cool days the concrete can be poured in 5-foot lifts, but in hot weather this must be cut down to about 3 feet to maintain a fresh monolithic joint in the concrete at all times.

The concrete is wheeled over the platforms by CMC concrete buggies as close as possible, and then chuted down steel chutes to its resting place. Chute sections of 10 feet make handling easy. The concrete is vibrated by Viber and Jackson vibrators and finished with wood hand floats. The outside exposed surfaces are cured with Sealtex concrete-curing solution.

The first roof pour required 42 hours, but this had been reduced to 26 hours when the third section was poured. It had also been found that the best way to handle a pour was to start it at night when the air was cool and damp, thus making it possible to get the heavier part of the section in while monolithic joining action of the concrete was most favorable.

"We learned an interesting lesson about Masonite form lining, too," Holger Nielsen admitted. "On the first pour we had the sheets butted up tight against each other. Naturally they buckled some up towards the top of the roof. On the next pour we separated the top Masonite sheets about ⅛ inch. The pressure of the concrete brought them up together nicely, and there was no buckling."

"You don't see any fins, either," Bob Smith interjected.

To pour the floor slabs, Bob Smith plans to use prefabricated wood side forms, and 20-foot-wide sections will be laid at a time. He plans to rig shop-built A-frames on the back of his truck-mixers, and to suspend 16-foot concrete chutes from the A-frame. The truck-mixers will then back up close to the form and chute the concrete wherever it is needed.

"This will work, I believe," Smith said, "but if it doesn't we may have to use a crane and concrete transfer bucket."

The concrete floor is to receive a special non-skid surface topping, which will in all likelihood make hand finishing mandatory on the big 102,000-square-foot slab. Thicknesses of the floor slab are 18 and 23 inches, with 5 inches in the office areas. The roof slab varies from 5 to 7 inches.

Considerable wood form work has been necessary for the ribs, foundation pours, and so on. These forms are all made up in the carpenter yard on the job, where power and hand tools are available.

Structural Steel

When the project was visited, the first structural-steel erection was getting under way by Holman Erection Co. A Manitowoc Speedcrane was being used to hoist the structural members for the big door frame and supports, and it looked as if this work would proceed rapidly.

By the time the snow comes again this winter, Nielsen hopes to have the big hangar about ready for the Army. The job still poses some problems, all of which will not be solved when the last roof arch is poured. Boilers and heating appurtenances will still have to be installed and tested. There is still a high, dangerous chimney to build. And last but not least, there is the hard job ahead of dismantling the big scaffold after the roof arches are all done.

"So far we haven't had a lost-time accident", Nielsen says, crossing his fingers. "If we can dismantle that scaffold without hurting anybody, we'll have a nice record for ourselves on this job".

Thew Shovel Promotions

M. B. Garber has been appointed General Sales Manager of the Thew Shovel Co. to succeed the late Don G. Savage. Mr. Garber formerly held the position of Assistant Sales Manager and Export Manager. Thew also announces the appointments of Q. J. Winsor and J. T. Cushing as Assistant General Sales Managers.

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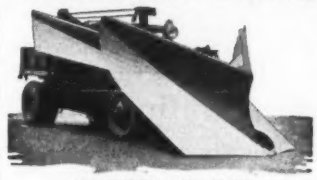
is Assured by

DAVENPORT-FRINK SNO-PLOWS



ALL TYPES AND SIZES

No matter what the snow or ice conditions, you obtain FASTER ● SAFER ● CLEANER snow removal with the lighter, yet stronger, DAVENPORT-FRINK SNO-PLOWS. Available in "V" and Straight Blade types for all sizes of trucks, tractors, road patrols and locomotives. Once you see them at work, you know why they are engineer-preferred throughout the snow belt.

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Hard-Facing Alloys For Tough Service

Two new hard-facing alloys are announced by the Stoody Co., 1136 W. Slauson Ave., Whittier, Calif. The Stoody self-hardening No. 21 is for applications involving extreme abrasion with moderate impact; the Stoody No. 1027 for severe impact with moderate abrasion. Both are recommended by the company for use on parts for tractors, power shovels, crushers, impellers, mechanical-loader lips, etc.

The No. 21 is of a tubular construction and is made from an alloy containing chromium, manganese, silicon, carbon, and zirconium. It is suitable for down-hand application and is furnished bare or coated. It can be used with ac or dc, and either straight or reverse polarity. It leaves a deposit with a Rockwell C hardness of 55, says Stoody; its graphite coating eliminates arc interference, slag, and chipping; it will bond readily with all steels, manganese, and cast iron; it will not spall, even when surface checks develop; and it can be applied in any bead-type multiple-pass work.

The Stoody 1027 is described as a low-cost rod with 'a mild-steel core wire, and with all alloys contained in a heavy, extruded, graphite type of coating. It is composed of chromium, manganese, and carbon. It can be used with ac or dc welders and leaves a deposit with a Rockwell C hardness of 45-49, Stoody points out. Among the features claimed for the 1027 are these: dense deposits, freedom from surface checks, fast deposition rate, deposits forgeable at red heat, multiple deposits without slag chipping, and all-position welding.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 78.

Portable Weed Burners

An 8-page folder about a line of portable weed burners has been made available by the Woolery Machine Co., 2919 Como Ave. S. E., Minneapolis, Minn. Woolery burners listed in Folder No. 157 are the Models A, PB-3, CT, D, and AB. Two inserts included with this folder describe the Models PB and AJX.

These publications indicate several features of the burners—the power unit, nozzle capacity, manner of mounting, width of swath covered, and so forth. The Woolery burners come in styles for mounting on trucks, in trailer-mounted units for towing to the job, crawler-mounted units, and self-propelled units mounted on a two-wheeled wheelbarrow type of chassis. The folder illustrates each of these models and lists complete specifications and features.

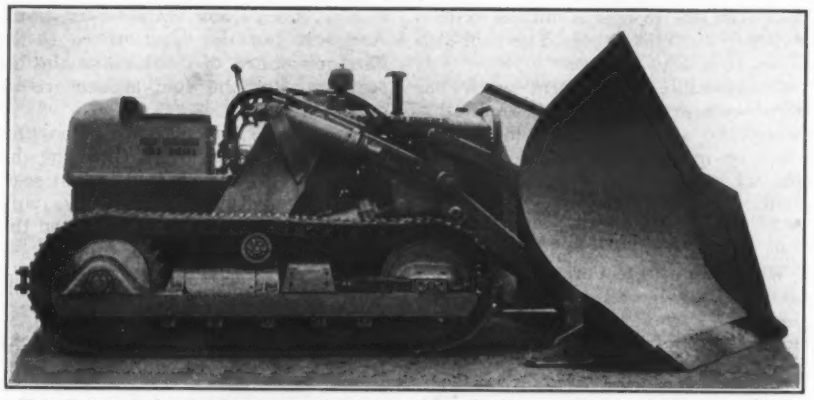
Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 41.

Harry H. Barber Dies

Harry H. Barber, Chairman of the Board of the Barber-Greene Co., died September 6. In failing health for several years, Mr. Barber retired as President of the company on September 25, 1945, to become Chairman of the Board. He was 70 years of age.

After receiving his M. E. degree at the University of Illinois in 1907, he was employed by the Stephens-Adamson Mfg. Co. In 1916 he formed a partnership with William B. Greene, joined later by D. G. McIlwraith. The Barber-Greene Co. was incorporated under that name in 1917.

A portable belt conveyor was the first of a line of constant-flow equipment designed by Mr. Barber. This was followed by the self-feeding bucket loader, vertical-boom ditcher, snow-loading machine, traveling asphalt-mixing plant and finishing machine, portable drying machines, and gradation-control units.



This V-type hydraulically operated snow plow has just been added to the Tractomotive line of equipment for the Allis-Chalmers HD-5 crawler tractor.

Snow-Fighting Units

A hydraulically operated snow plow and a 2-cubic-yard snow bucket have been added to the line of tractor-mounted equipment made by the Tractomotive Corp. of Deerfield, Ill. Both attachments are designed as matched equipment for the Allis-Chalmers HD-5 crawler tractor, and are interchangeable on the Tracto-Shovel assembly. Mounting them requires no special equipment, the manufacturer explains.

Dimensions of the plow are as follows: width on the ground, 116 inches; width at the top, 128 inches; height of the V in front, 44 inches; and height of the V in the rear, 66 inches. The snow bucket is 96 inches wide and has a capacity of 2 cubic yards.

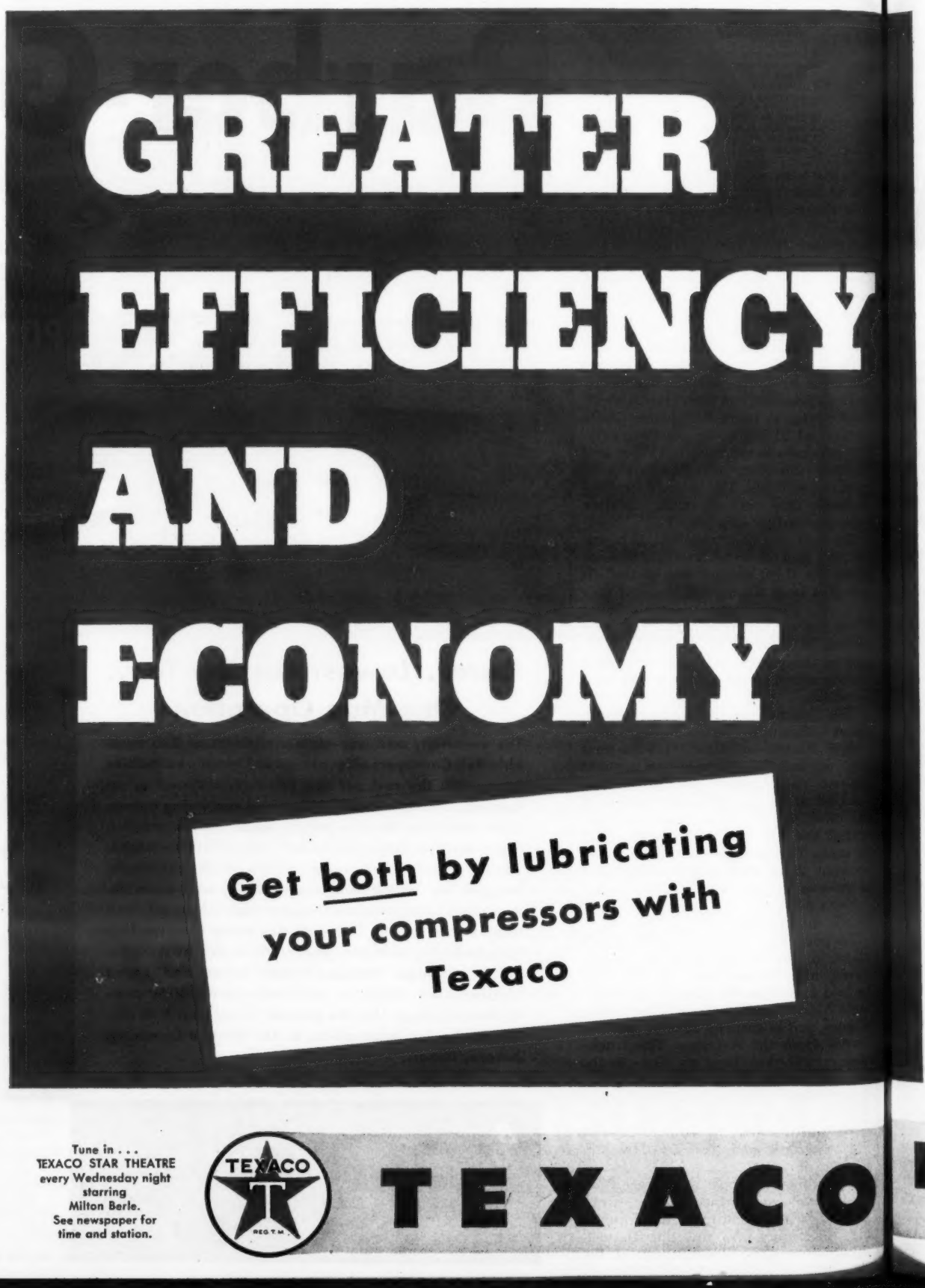
Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 111.

Crushers, Screens, Driers

A catalog of its complete line of products has been prepared by the Kennedy Van Saun Mfg. & Engg. Corp., 2 Park Ave., New York 16, N. Y. Among the products listed are crushers, conveyors, elevators, screens, grizzlies, classifiers, feeders, bin gates, standard and special gears, slurry pumps, driers, hoists, and many others.

The catalog, No. 44-A, lists each of these in detail, points out its principal features, and shows its parts and design by means of drawings and photographs. The book is indexed as an aid in locating specific Kennedy products.

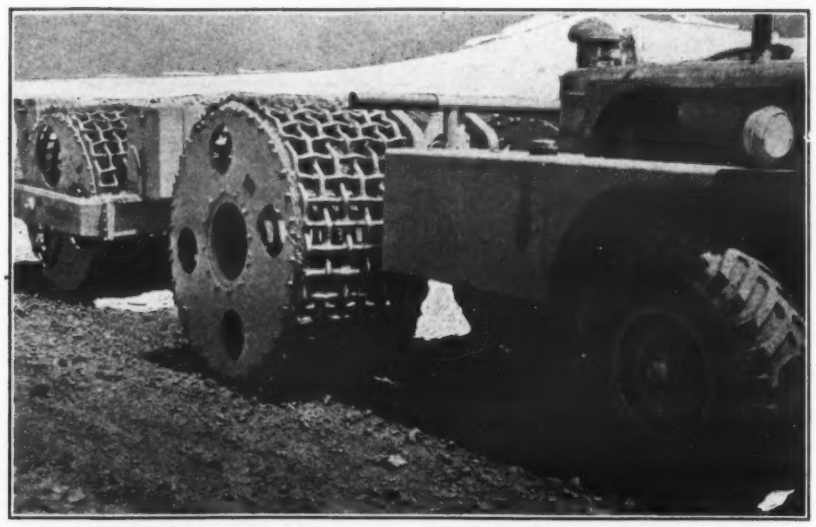
Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 127.



Compaction Roller Has Grid-Type Face

A new type of roller has been developed to compact fill materials, subgrades, and stabilized base courses. It is manufactured by the Gardner-Byrne Construction Co., 649 S. Olive St., Los Angeles 14, Calif. Because of its grid-type surface, the roller is said to compact from bottom to top without leaving a loose surface, and to depress or pulverize oversize stones.

The grid roller is 5 feet in diameter and is made of heavy cast-steel segments which are individually replaceable. The interlacing 1½-inch bars form a series of 3½-inch-square openings. According to the manufacturer, high-pressure points are formed at the overlaps, with clear openings adjacent to them; thus maximum compression is combined with ample provision for movement of the individual aggregate particles into their most advantageous positions. At the same time, movement of particles is said to be localized so that mass lateral displacement is avoided.



This new compaction roller with an open-mesh grid surface is designed to compact from bottom to top without leaving a loose surface area.

The roller contains a mesh-cleaning device, and provision for varying the weight to increase or decrease the applied pressure is optional. The roller is offered as a 5-foot-width double-section tow unit which can be used singly or in multiple combinations. It can also be used as an 8-mph self-propelled assembly covering a 10-foot width. The roller was engineered by the Frank J. Lopker Co., also of Los Angeles.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 31.

Two-Way Radio Equipment Aids County Snow Fights

The effectiveness of snow-removal equipment when supplemented by two-way radio is demonstrated by the Onondaga County Highway Department in central New York State. This County has equipped three of its snow plows and a 10-ton "tank retriever" wrecker with two-way General Electric FM transmitters and receivers. And forty other pieces of snow-fighting equipment now have G-E radio receivers. The wrecker is used to restore to service any disabled plows stalled on the 670 miles of county highway. Raymond B. Traver, Superintendent of Highways for the Department, says that the radio equipment has made it possible to combat many snow storms with less than half the mobile equipment usually required.

The radios operate on a highway-maintenance radio channel of 37.98 megacycles. The 250-watt transmitter is located at Pompey, N. Y., at an elevation of over 1,600 feet. Station receivers are set up at outlying county shops in Marcellus and North Syracuse. The transmitter is remotely controlled, over a single-pair telephone line, from the Highway Department's shop at Jamesville, 3½ miles away.

Convertible Crane Unit

A catalog on the Wayne Model 22 convertible crane unit has been prepared by the Wayne Crane Division of American Steel Dredge Co., Inc., 2000 Taylor St., Fort Wayne 1, Ind. This rubber-tire-mounted self-powered unit can be used as a shovel, trench hoe, dragline, clamshell, and crane.

Among the features of the Wayne crane which are illustrated and described in Catalog No. 406 are the self-leveling chassis, the 20-inch clutches with 3-inch faces, the anti-friction bearings, the hydraulic steering mechanism, large wire-rope-winding drums, cut gears, and several others.

A 2-page spread illustrates each of the uses of the Wayne crane. It shows photographs of the various attachments mounted on the basic unit, and also on-the-job photographs of the machine in use with each of the five attachments. Specifications list working ranges, capacities, dimensions, and other operating factors for the machine. The final page of the catalog gives unit weights in cubic yards and cubic feet for 49 materials.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 120.

Golden Year for Goodyear

The 50th anniversary of The Goodyear Tire & Rubber Co. was celebrated last month at the home office in Akron, Ohio. Participating in the program were some 1,700 key executives of the company, several hundred of whom were called home from all parts of the United States and foreign nations. Featured during the program were dramatic reviews, a movie depicting the story of American opportunity and produced especially for the celebration, business sessions, addresses by top officials of the company, and a banquet. The company's 450,000,000th pneumatic tire was produced during the celebration.

Photo courtesy Joy Mfg. Co., Sullivan Division.

GIVE your compressors effective lubrication – *Texaco* – and they'll deliver full volume and pressure for extra hundreds of hours between overhauls. Texaco has a complete line of lubricants to assure greater efficiency and economy for compressors of every size and type under all operating conditions.

Texaco Cetus, Alcaid and Algol Oils, for instance, have all been specially processed to remove impurities that form hard carbon and gummy deposits. They keep valves clean, rings free, ports open and air lines clear – greatly reduce the need for repairs, replacements and overhauls.

For compressing wet air, use *Texaco Regal Oils (R & O).* They give full protection against rust formation – even during idle periods and in intermittent operation. To make your drills last longer – run more efficiently and economically – use *Texaco Rock Drill Lubricants EP.*

A Texaco Lubrication Engineer will gladly help you select the best Texaco lubricants for your particular needs. Just call the nearest of the more than 2300 Texaco Wholesale Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

C. & E. M. Photo
Excavation Superintendent E. A. Carter and Assistant Resident Engineer J. J. Less confer about the Omaha levee job.

A Levee Specialist Hurries Dirt Moving

(*Continued from page* 1)

C. B. & Q. repair shops will be safe during high-water periods. When the comprehensive plan goes into effect, the Missouri River flow at Omaha can be absolutely controlled to 250,000 cfs maximum. Then there can be no repetition of the disastrous flood of 1943, when millions of dollars of property damage was suffered.

The new levee will tie into a heavy sheet-pile and concrete floodwall through Omaha's downtown industrial section. This floodwall is also currently under contract.

The levee is being built with impervious clay and silt rolled to 90 per cent of standard density. It has a 10-foot crest, except for a few 20-foot points at ramps and turnouts. Side slopes are 3 to 1 riverward and landward, and the height of the new levee varies from 10 to 17 feet.

Borrow pits selected by the Corps of Engineers are generally close to the levee site in 800-foot hauling range. At the west end of the job, however, a large hill is to be moved to furnish material for the structure along the C. B. & Q. railroad tracks, and hauls there may be up to 5,000 feet. Wherever the borrow pit is close to the levee, a 100-foot distance must be maintained between the riverward toe of slope and the start of the borrow-pit excavation.

Equipment and Methods

Ace Construction Co. is using some of the same units of equipment which performed so well on the Hamburg job, plus some new ones. When the job was visited, 7 Caterpillar DW10's and 2 DW10's with Trailwagons were in use. It was expected that about 12 DW10's would be used later. Four Caterpillar D8's with LeTourneau 12-yard Carryalls are being used for short hauls. The job also has a Lorain TL-20 dragline, two Caterpillar dozers on D7's, a D6-mounted dozer, one D7 and two D8 pusher tractors.

Latest addition to the dirt-machine fleet is a new LeTourneau Model C Tournadozer, whose accomplishments are attested by Erickson with the following story: A huge cottonwood tree had been ripped out of the ground with powder, and lay obstructing a roadway. Army safety engineers ordered it moved. Two tractors in the borrow pit were sent down, but they failed to move the tree. Erickson then gave orders to the man on the Tournadozer to go down the first chance he got, and help the

(*Concluded on next page*)

C. & E. M. Photo
Workmen clean out and form one of the 17 structures called for on the levee job along the Missouri River at Omaha, Nebr.

Plywood Announcement!

1 A New, Simplified A-B-C System of Grade Identification for Douglas Fir Plywood Is Now in Effect.

2 Douglas Fir Plywood Is Now Produced in Accordance with New U. S. Commercial Standard CS45-48.

In order to simplify the identification of Douglas fir plywood grades, manufacturers have adopted a new A-B-C system of grade-marking.

Plywood is manufactured in two distinct types—Exterior and Interior. Within each of these two types are several appearance grades. These grades—of either Exterior or Interior type—are determined by the appearance quality of the *outer plys* (face and back veneers).

Now, there are just four such qualities of veneer—A, B, C and D, in order of appearance quality.

Highest in appearance quality — "A" veneer — is that formerly known as "Sound." "B" veneer is a new quality, also known as "Solid," which presents a firm, solid surface, free from open defects. "C" and "D" veneers may contain certain restricted defects which do not affect panel serviceability, and are used where appearance is not important.

*As the new A, B, C, D veneer designations are being introduced, industry grade-trademarking of panels provides for designation either by letters or by previous terminology. Thus, as listed above, grademarks on panels may read either "PlyShield A-C" or "PlyShield Sol S" (Sound 1 Side).

GRADES OF EXTERIOR-TYPE

EXT-DFPA•A-A (Sound 2 Sides)
EXT-DFPA•A-B (Sound 1 Side, Solid Back)
EXT-DFPA•PlyShield•A-C (Sound 1 Side)
EXT-DFPA•Utility•B-C (Solid 1 Side)
EXT-DFPA•Sheathing•C-C
EXT-DFPA•Concrete Form•B-B (Solid 2 Sides)

GRADES OF INTERIOR-TYPE

Interior•A-A•DFPA (Sound 2 Sides)
Interior•A-B•DFPA (Sound 1 Side, Solid Back)
PlyPanel•A-D•DFPA (PlyPanel Sound 1 Side)
PlyBase•B-D•DFPA (Solid 1 Side)
PlyScord• C-D•DFPA (Sheathing)
PlyForm•B-B•DFPA (Solid 2 Sides)

The new U. S. Commercial Standard CS45-48 for Douglas fir plywood becomes effective November 1, 1948. The Commercial Standard booklet contains complete data on the new system of grade identification* and new grade-trademarks, and sets forth more stringent performance requirements for Exterior-type plywood. A free copy will be mailed to any point in the United States. Send the coupon below.

Douglas Fir PLYWOOD
LARGE LIGHT STRONG Real Wood Panels

DOUGLAS FIR PLYWOOD ASSOCIATION
Tacoma 2, Washington

GENTLEMEN: Please send me my copy of the new U. S. Commercial Standard CS45-48, which contains new grade designations and new grade-trademarks for Douglas Fir Plywood.

NAME .....
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Title .....
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other machines.

"When the fellow got down there, the other rigs had moved off to do something else", Erickson said. "The Tournadozer operator is one of the best men I've got, and he'll try anything. Damn if he didn't wiggle around, get his dozer blade under the stump of that tree where he could lift it, and shove the tree aside and over a 5-foot bank by himself!"

The machine was assigned at first as a pusher tractor in the borrow pit. Two other dozers on the levee fill were hard-pressed to keep up with dumping and spreading. A change was made: one of the crawler tractors was sent down to the borrow pit and the Tournadozer went to the fill. It did its job so fast there that, as Erickson says, "The other dozer stood around with little to do".

"On another place, we had to push every piece of equipment through one spot, and spread the material they hauled", said Erickson. "We had two bulldozers in the pit as pushers. The Tournadozer handled not only all pushing on the fill but all spreading as well!"

The big Ace Construction Co. dirt-moving fleet still is built around its nucleus of fast, rubber-tired Caterpillar DW10's. These machines speed down haul roads between the borrow pits and the fills, dump their loads, and return to the pits. The material being excavated at Omaha is a hard, dense clayey silt. It is spread in 9-inch lifts, rolled six times by a 595-psi sheepsfoot tamping roller, and compacted to 90 per cent or better of standard density.

Many of the moisture curves of this soil show an optimum content of 24½ per cent. A great deal of the material has about that much moisture in place, but it has also been necessary to use rollers and blades to aerate dirt with as high as 50 per cent moisture—and still apparently quite stable.

Because of the 17 concrete structures in the job, it has been impossible to build long stretches of levee. The maximum length of fill between structures is only 1,400 feet. The levee is being built between the structures, making rather flat 3 to 1 slopes at the ends of the section. Later, when the concrete is poured under a subcontract, the remainder of the earth will be placed.

Performance has been excellent, though on account of the delay on structures only a single 9-hour shift is being worked. On several days, 12,000 cubic yards have been placed by 7 DW10's and 4 Carryalls. Performance has averaged about 7,000 cubic yards a day.

One of the most efficient parts of the job will be the finishing of slopes when all the earth fill is in, preparatory to seeding. With one tractor on the top of the levee and another at the bottom, a set of Caterpillar tractor crawler tracks will be dragged twice over the slope. This heavy weight often picks up and carries about 8 cubic yards of material, filling in the low places while it knocks down the humps. The smooth finished surface will then be sown with a seed mixture to prevent wind or water erosion.

Started May 23 this year, it is expected that the job will be complete except for seeding by November 30. The levee will mark one more milestone in the overall taming of the Big Muddy, a job man cannot yet say that he has successfully accomplished.

Personnel

The Omaha levee was designed and the work on it administered under the general supervision of Colonel Louis W. Prentiss, Omaha District Engineer for the Corps of Engineers, and L. G. Leavitt, Resident Engineer.

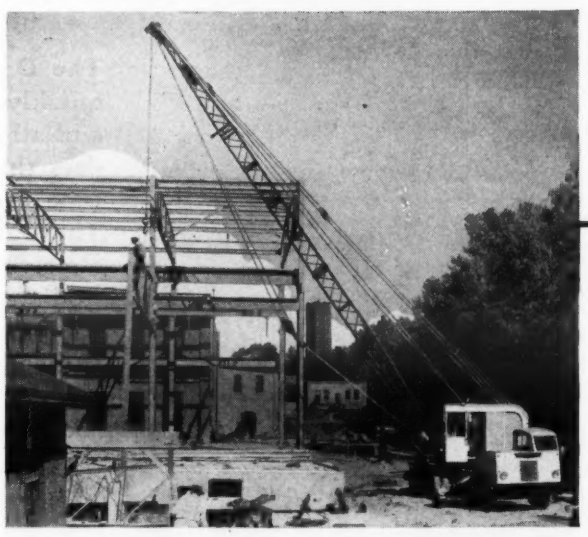
Ace Construction Co. was represented in the field by Parker Erickson, President and General Manager; General Superintendent Allen Tooley; E. A. Carter in charge of dirt work; and Dan Palmer and Ralph Kizer as Master Mechanics.

C. & E. M. Photo

Here's some of the Ace Construction Co. equipment huddled together on a section of levee after a rain. This view looks east on the Omaha job.

Research Director Named For Raybestos-Manhattan

S. R. Zimmerman, Jr., has been named Director of Friction Material Research and Development for Raybestos-Manhattan, Inc. He will direct activities on friction materials at the company's plants in Stratford, Conn.; Manheim, Pa.; Passaic, N. J.; and North Charleston, S. C. Mr. Zimmerman has been with the United States Asbestos Division at Manheim, Pa., for 16 years, where he will continue to make his office.



BACK OF SPEEDING LINES OF CARS are bustling production lin
And back of *them* is a vision typically American . . . a vision based on the co
fidence that industry could devise new techniques and place the one-tir
"luxuries of kings" within the reach of everyone.

With confidence like that, Roebling has led the way in developing a
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The confidence our products and engineering have won throughout indust
is an asset that every Roebling employee works to preserve.

CONSTRUCTION MEN CUT WIRE ROPE COST

ROEBLING PREFORMED "BLUE CENTER" STEEL WIRE ROPE slashes costs wherever severe bending is encountered. The unequalled combination of Roebling "Blue Center" Steel and Roebling preforming gives you tops in flexibility and wire rope service life.

You'll find that Roebling Preformed "Blue Center" saves time and money in other ways, too. It's easy to handle, for it doesn't twist or kink. You can cut it without seizing. Broken wires lie flat and don't puncture the hands. It reduces whippi
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A CENTURY OF CONFIDENCE **ROEBLING**

JAR ROEBLING

★ *WIRE ROPE AND STRAND* ★ *FITTINGS* ★ *SLINGS* ★ *SUSPENSION BRIDGES A*
CABLES ★ *AIRCORD, AIRCORD TERMINALS AND AIR CONTROLS* ★ *AERIAL WI*
ROPE SYSTEMS ★ *ELECTRICAL WIRE AND CABLE* ★ *SKI LIFTS* ★ *HARD, ANNEAL*
OR TEMPERED HIGH AND LOW CARBON FINE AND SPECIALTY WIRE, FL
WIRE, COLD ROLLED STRIP AND COLD ROLLED SPRING STEEL ★ *SCREE*
HARDWARE AND INDUSTRIAL WIRE CLOTH ★ *LAWN MOWERS*

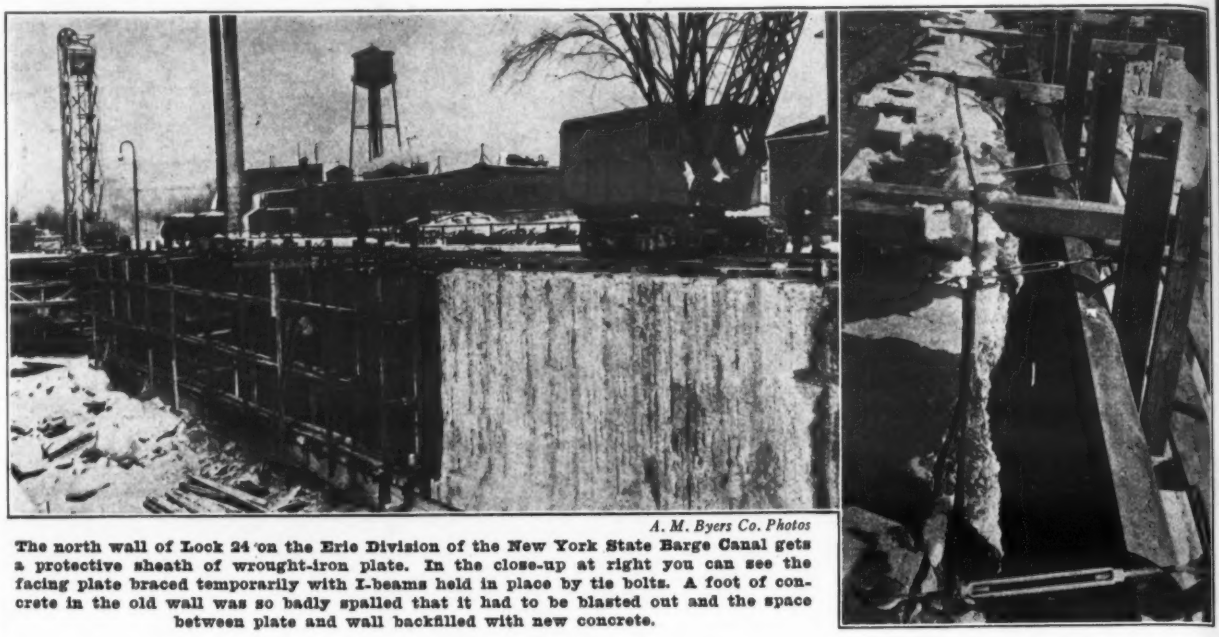
Wrought-Iron Facing Protects Canal Wall

A badly spalled section of concrete on the Erie Division of the New York State Barge Canal has had its face lifted. The chamber walls of the canal locks are subject to deterioration from the chemical action of the water, alternate freezing and thawing, wetting and drying, and the severe abrasion caused by barges scraping the sides. To protect the north wall of Lock No. 24 at Baldwinsville, N.Y., it was decided to sheath it with a protective coat of wrought-iron plate. The project—under the supervision of the New York State Department of Public Works—was started shortly after the 300-foot-long lock was closed last winter.

Preliminary work began with the removal of about a foot of the wall—built in 1910—by blasting with dynamite. Holes for the dynamite sticks were drilled in the wall to a depth of 16 feet. This operation was followed by placement of the wrought-iron sheets.

The plates used were ⅜ inch thick. Three of these plates were fastened into a section by continuous welds. Handling and alignment during installation were facilitated by I-beams temporarily attached to the outer face. Butt straps—cinch-anchored to the base of the wall—helped to line up the plates.

The plates were attached to the wall by cinch anchors and wrought-iron bolts. Ends of the bolts were plug-welded to the plates. The space between the plate and the wall section was backfilled with concrete. Tops of the plate section were bent in on a radius of 8 inches. At ladder recesses in the walls, the plates were bent in on a radius of 6 inches. Plates were installed so the joints would be in the same position as the original concrete joints, thus making the plate sections integral with the concrete sections to which they were attached.



A. M. Byers Co. Photos

The north wall of Lock 24 on the Erie Division of the New York State Barge Canal gets a protective sheath of wrought-iron plate. In the close-up at right you can see the facing plate braced temporarily with I-beams held in place by tie bolts. A foot of concrete in the old wall was so badly spalled that it had to be blasted out and the space between plate and wall backfilled with new concrete.

G. E. Spain Joins ECA Staff

Gail E. Spain, Vice President of the Caterpillar Tractor Co., has joined the staff of the Economic Cooperation Administration. Mr. Spain will screen foreign orders for agricultural equipment needed by Marshall-Plan nations. His main job will be to figure out how much equipment can be spared from a tight U. S. market.

THE SILENT *Watchman*

HI-WAY TRAFFIC SIGN

Standard equipment with many companies. All metal construction. High visibility. 19" wide by 30" high. Folds compactly for storing. Double-faced sign plate, yellow background with black letters, as illustrated.

IPCO — Safety Equipment for all Industries

Write for BULLETIN D-118

INDUSTRIAL PRODUCTS COMPANY
2855 N. FOURTH STREET · PHILADELPHIA 33, PA.

DALLETT'S "HOLEDRILL"

Dallett's New
Self-rotating, Light Weight
Pneumatic Drill

Dallett's *Holedrill* has an instantaneous rotating action which eliminates the need of drill bit wrenches. A patented retainer prevents accidental release of the drill in tool, an invaluable feature for working on scaffolding or over water.

SPECIFICATIONS

CAPACITY: (at high speed)
¼" to ¾" Drills.

WEIGHT:
9½ lbs.

SPEED:
1800-2000 S.P.M.

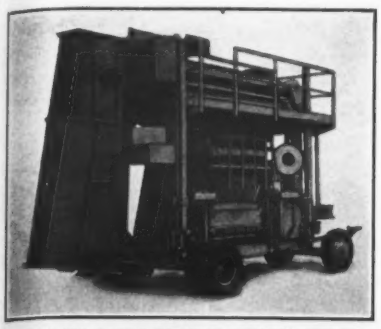
LENGTH:
With Retainer 16"
Without Retainer 13"

Speedy—Indispensable

The Dallett *Holedrill* drills holes quickly in concrete, brick, mortar and all types of stone or rock. It does the job in a fraction of the time required by other methods. The Dallett *Holedrill* can be used almost anywhere. Its great accessibility makes quick, light work of many apparently impossible jobs. Indispensable as an industrial maintenance tool—and an absolute necessity for the construction contractor.

Write for Bulletin 102

THE DALLETT COMPANY
PNEUMATIC DALLETT EQUIPMENT ACCESSORIES
Manufacturers of Pneumatic Tools and Accessories
SINCE 1883
MASCHER AT LIPPINCOTT STREET
PHILADELPHIA 33, PENNSYLVANIA



The 1,000-pound Madsen asphalt-paving plant rolls on its own wheels to out-of-the-way jobs where long hauls are impractical and the size of the job does not warrant permanent installation of a larger plant. Its capacity is 30 to 40 tons per hour.

Asphalt-Paving Plant Is Mounted on Wheels

A portable asphalt-paving plant is announced by the Madsen Iron Works, 5631 Bickett St., Huntington Park, Calif. Feature of the Madsen unit is that the entire plant is mounted on pneumatic wheels for rapid transportation from job to job. Its capacity is listed at from 30 to 40 tons of bituminized aggregate per hour.

According to the manufacturer, the Madsen 1,000-pound plant can be profitably used on jobs as small as 1,500 tons or as big as from 7,000 to 10,000 tons. It is equipped with Madsen-patented jack legs on all four corners to simplify erection. Madsen states that complete erection can be achieved without the need for cranes, jim poles, or skids.

Power can be supplied by an electric motor or diesel engine. And this single source of power is used to operate all parts of the plant including the cold-stone elevator, dust-elevator, screw vibrating screen, pugmill mixer, and pressure-injection pump. Only the lower half of the elevator is removed when the unit is prepared for travel. Made in two sections, the upper section slides on greased rails. A chain hoist installed on the equipment raises the upper section of the elevator to operating position and lowers it to transport position. The bucket chain is not removed.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 18.

Portable Heating Units

High-powered portable heating units are described in a bulletin prepared by the Ennis Supply Co., 324 First St., N., Minneapolis, Minn. They were obtained by Ennis as war-surplus material and are offered for general distribution. The heaters were manufactured by the Stewart-Warner Corp., and are said to develop 100,000 Btu's per hour.

The broadside contains a photograph of the unit and several drawings illustrating some of the cold-weather uses for which it is adaptable. It describes its features, including the three ducts for tunneling heat to the desired location, and lists several specifications including weight, horsepower rating, fuel consumption, etc.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 27.

Changes in FWD Sales Div.

A series of major changes in the organization of its Sales Division are announced by The Four Wheel Drive Auto Co. of Clintonville, Wis. A. E. Johnson is named Supervisor of Government sales; C. A. Rogers is Supervisor of fire-truck sales; Lloyd Scheider is Supervisor of defense sales; Roy Peterson is Supervisor of oil-field sales; and C. C. Cooke is Supervisor of the Order Department. Leo Polzin is Manager of National Accounts; Stanley Wick is Assistant Director of Sales in charge of all office domestic sales activities; Jack Kelly is Assistant Director of Sales in charge of administration of FWD's field organization; John Battes is Acting Manager of the Western Sales Zone; and Howard Collard is Acting Zone Manager in the southeastern states.

Small-Hole Rock Bit

A rock drill bit for cutting holes from ¾ to 1⅛ inches in diameter is announced by the Rockbit Sales & Service Co., 2514 E. Cumberland St., Philadelphia 25, Pa. It is for use with a jackhammer, and has a tungsten-carbide inlaid insert.

Among the features claimed for the Whirli Bit are fast penetration, uniform-diameter holes, and positive chip-cleaning action. It stays sharp after repeated use, says the manufacturer; it eliminates blacksmithing, and it fits standard-threaded hollow drill steel.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 82.

We Are Happy To Announce

The merger of Lewis Manufacturing Co., manufacturer of Pierce Bear Tandem Rollers, with the Browning Manufacturing Co., manufacturer of BMCO Pneumatic Tired and Sheeps Foot Rollers.

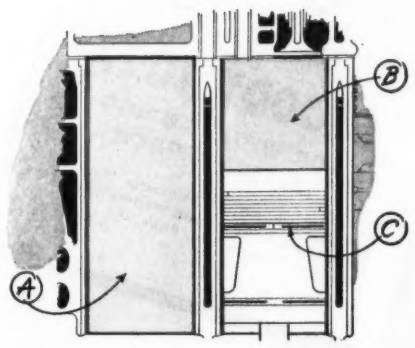
See your Dealer or contact us for full information on our complete line of compaction rollers.

A few territories are open to dealers under this new arrangement and we will welcome inquiries.

LEWIS-BROWNING MFG. CO.

111 Humble Ave. P.O. Box 2707
San Antonio 6, Texas

CASE D119E—REDUCING WEAR ON LINERS IN DIESEL ENGINES



DIESEL ENGINE LINERS AND PISTON

In high-speed Diesel engines lubricated with RPM DELO Diesel Engine Lubricating Oil, wear on liners was held to a minimum with little variation over their entire areas. A constant lubricating film was maintained on them even in high-temperature belts. RPM DELO Oils are recommended for all types of Diesels. Come in all viscosity grades necessary for your engines.

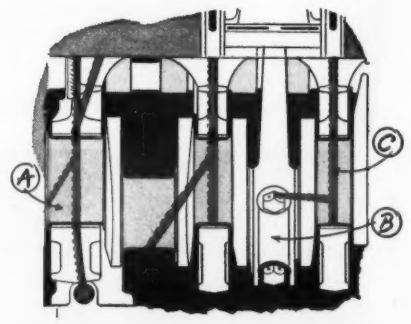
A. Special additive provides metal-adhesion qualities...keeps oil on all parts whether hot or cold, running or idle.

B. An anti-oxident resists formation of lacquer—resistance to extreme heat provides lubrication in the toughest conditions.

C. Contains detergent which keeps rings clean and operating freely...prevents scratching and gouging of liners.

RPM DELO Diesel Oil will not corrode any bearing.

CASE D119F—PROLONGING THE LIVES OF BEARINGS IN DIESELS



SECTION OF DIESEL ENGINE CRANK AND CAM

No bearing failures occurred between overhaul periods in Diesel engines used in the toughest service when they were lubricated with RPM DELO Diesel Engine Lubricating Oil.

A. Non-corrosive to all types of bearing metal...inherent ability of base stocks and added compound resist oxidation and formation of acid which is common cause of bearing corrosion.

B. Maintains a tough lubricating film which withstands excessive shocks and pressures.

C. Special detergent compound keeps oil passages clean and open - allows free flow of lubricant to vital points.

Another compound in RPM DELO Oil prevents foaming of the oil. An accurate measurement of crankcase levels can always be obtained.

For additional information and the name of your nearest Distributor, write

STANDARD OIL COMPANY OF CALIFORNIA

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Standard Oil Company of Texas
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RPM DELO — DIESEL ENGINE — LUBRICATING OIL

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Gravel Road Replaced By Concrete Highway

Two 12-Foot Lanes Laid Separately on 11-Mile Job; Expansion Joints Placed On 420-Foot Centers

✦ THE Louisiana Department of Highways has recently reconstructed an 11-mile stretch of State Route 31 in Plaquemines Parish between Myrtle Grove and Diamond. A 24-foot concrete pavement has replaced the old gravel road that ran along behind the great levee on the right bank of the Mississippi River through the Deep Delta country of Louisiana. Contractor for the state was T. L. James & Co., Inc., of Ruston, La. The project, which cost close to $1,000,000, included considerable clearing and grading, and the construction of concrete slope mats for protection against wave wash. Work on the contract began late in 1946 and was completed last August.

Plaquemines Parish (or County) is a narrow peninsula reaching out into the Gulf of Mexico off the lower coast of Louisiana. Through this peninsula flows the Mississippi in the final stages of its long course before it leaves the continent. For after the river passes New Orleans it still has 115 miles to go before it reaches the sea. In this lower reach the river levees along the banks attain their greatest size to prevent flooding of the slender strip of land.

There are only two roads in this parish. Behind the levee on the left bank, State Route 1 extends from New Orleans southward to a few miles below Pointe a la Hache. State Route 31, the only other road, is longer, stretching down beyond Fort Jackson behind the right-bank river levee. It finally ends when the levee disappears, and when the land gives way to the swamps and marshes of the Delta just above the Head of Passes at the Mississippi's mouth. This important artery of transportation to the citrus-fruit center of Louisiana as well as to the land of the hunter, trapper, and fisherman, is partly paved with bituminous or concrete surfaces, while the remainder of its length is a gravel road.

Old Canal Filled In

Such was the section south of Myrtle Grove recently reconstructed. The old gravel road averaged 22 feet in width without shoulders, but at one point its effective width was cut nearly in half. This occurred where it traversed a narrow strip of land between the levee on the east side and the waters of Lake Hermitage on the west. The lake encroached on the road in times of high water, and the erosive action of the waves washed away the gravel roadbed so that at certain periods only one-way traffic was possible. Maintenance was naturally costly.

At the upper and lower ends of the 11-mile contract the new alignment followed the old road rather closely. In between, however, the center line was shifted slightly to the west to eliminate some curves in the old road which followed more or less the line of the river levee. This threw the new location in some places directly over an old canal which had been dug as a borrow pit to furnish material for the embankment of the original road. The borrow ditch or canal was 30 feet wide and from 8 to 10 feet deep. The section over which the new road is located is about 3½ miles long.

Around this canal the lush semi-tropical vegetation had grown to jungle-like thickness, and the quiet, murky waters were crawling with countless alligators. Most of the clearing was done by hand, since the dozers were too heavy for the soft ground to support, especially when it was wet. A crane, with a clamshell bucket at the end of its boom, also helped in the clearing. It worked along the road edge of the canal, booming over to the opposite side.

When the surrounding area was cleared, the canal was dammed off in sections about 600 feet long with earth dikes, and the water was pumped out from the rectangular chamber. Three Rex pumps, one 6-inch and two 4-inch units, were kept constantly at work, for the seepage from the canal banks and the adjoining sections was considerable. The water was pumped into the lake to the west. From 3 to 4 feet of muck was scraped from the bottom of the canal by a P&H dragline with a 50-foot

(*Continued on next page*)

C. & E. M. Photo

A Koehring 34-E Twinbatch paver, with its skip raised, mixes a batch of concrete for the 11-mile reconstruction job in Plaquemines Parish.

NOW! BETTER
with 2 NEW, low cost
STOODY SELF-HARDENING 21
FOR EXTREME ABRASION RESISTANCE
RECOMMENDED FOR: Bulldozer Blades, Dippers, Elevator Bucket Lips, Crushers, Impellers, Muller Tires, Grizzlies, Etc.
STOODY 1027
FOR WITHSTANDING SEVERE IMPACT
RECOMMENDED FOR: Tractor Track Rollers, Idlers, Crawler Pads, Mechanical Loader Lips, Tie Tamping Bars, Picks, Etc.

Here's the ideal COMBINATION

to get more wear, longer life with utmost economy on all heavy equipment.

FOR YEARS, wear protection on heavy equipment has been a problem because of the many wear factors involved and diversity of application requirements. For example, an alloy with high impact strength sacrifices some wear resistance and vice versa; smooth, fluid deposits defeat position welding; high alloy content with increased wear resistance loses forging qualities. And low cost electrodes are always a major requisite.

Obviously one hard-facing alloy can't do all jobs equally well. That's why Stoody now offers TWO new rods to cover your everyday hard-facing requirements on heavy equipment. No single rod can do what this low-cost combination does because you can now select the *best* alloy for specific wear problems. Each rod has been completely field-tested for over a year on a wide range of applications. Results are positive on recommended uses.

TYPICAL EXAMPLES WHERE STOODY

DREDGE PUMP CASING—*A typical application of Stoody Self-Hardening 21. A ¼" single pass layer is applied manually to the new casing. May be reapplied as needed.*

MULLER TIRES—*Unprotected Muller tires normally lasted 2 years. After applying 75 lbs. of Stoody Self-Hardening 21 this tire shows practically no wear in 5 month's operation, will probably last 3 years or more with greatly increased efficiency.*

C. & E. M. Photos

These three views of the Plaquemines Parish road job show a Meadow Steel Products expansion-joint assembly at left, held in place by five metal pins driven with a sledge hammer; a batch of concrete dumped on top of reinforcing steel, center, in front of a Jaeger-Lakewood double-screed finishing machine; and the concrete batch plant at right, with a Blaw-Knox 200-barrel cement bin in the foreground.

boom and a 1-yard bucket, and the material was cast to the lake side of the excavation. Double timber mats were required to support the rig in the soft footing.

Then the canal was filled in with borrow taken from the batture on the levee side of the road, and from a pit on the lake side of the road. Suitable material that would compact to the required 95 per cent density was difficult to obtain in large quantities. From the batture a suitable grade of sand was obtained, but only limited amounts could be taken from this source. At the other pit, about 13 feet of clay was first excavated before a 4-foot layer of good-quality sand was reached. The clay was placed in the canal under the shoulders and slopes of the new roadbed, but only sand was used as a foundation for the pavement.

Two draglines worked the borrow pits, a General and a Lorain, both equipped with 35-foot booms and a Yaun 1-yard and a Hendrix ¾-yard bucket respectively. The material was hauled in a fleet of 18 dump trucks an average distance of 3½ miles. Dozers spread the borrow in 8-inch lifts for compaction by a sheepsfoot roller.

Erosion Protection

The rest of the highway grading was done in a similar way, with the draglines digging the required material out of borrow pits, and trucks hauling it to the road. Plank roads usually had to be constructed to these pits as the ground was too soft to bear a truck. These haul roads consisted of 2 x 8's, 2 x 10's, or 2 x 12's laid down as ties on 2-foot centers, supporting two runners for the vehicles to track over. Two sets of two 12-inch boards were nailed to the ties for runners. Five tractor-dozers were used on the job, either at the borrow pits or spreading the material in 8-inch lifts. They included four Caterpillars—three D7's and a D6—and an International TD-9. Final shaping was done by a Caterpillar No. 12 motor grader. The roadbed was built 40 feet wide to include the 24-foot pavement and 8-foot shoulders.

For a distance of 3,500 feet where the new road borders on the lake, the slope is protected against erosion by a 4-inch-thick concrete mat extending from 12 to 17 feet out into the water. Retaining dikes were first thrown up by the dragline at the foot of the 4 to 1 slopes, and the concrete was placed in 10-foot alternate lanes. Forms were made of 4 x 4's and 2 x 4's. At the foot of the mat a 2-foot concrete toe wall was built for the length of the protection.

These preliminary operations went on through the winter of 1946-47 and throughout 1947. Work was at a standstill last winter because of unfavorable weather, and concrete paving did not get under way until March.

(Continued on next page)

WEAR PROTECTION
Stoody Hard-Facing Alloys!

STOODY Self-Hardening 21

DESCRIPTION

A low cost, high alloy fabricated rod (alloys in tubes) composed of chromium, manganese, silicon, carbon and zirconium. Possesses highest abrasion resistance of any rod in low priced field, with good impact strength and excellent weldability. Exceptionally economical on big equipment requiring large hardmetal deposits. Primarily recommended for down-hand application.

WELDING CHARACTERISTICS

Fastest deposition rate of any low cost alloy.
AC-DC application, straight or reverse polarity, on both bare and coated rods.
Bare rods run as easily as coated.
Bonds to all types of steels, manganese and cast iron.
Will not spall even when surface checks develop.
Graphite type coating eliminates arc interference and slag. No hot slag hazards, no more slag chipping.
Multiple passes for heavy deposits.
Can be applied in any bead type.

SIZES: Available both BARE and COATED in following sizes: 1/8" Coated, 5/32" Coated, 3/16" Bare and Coated, 1/4" Bare and Coated, 3/8" Bare. Prices range from 50 cents to 85 cents per lb. depending upon rod size and quantity.

STOODY 1027

DESCRIPTION

Low cost coated rod having a steel core wire with all alloys contained in a heavy, extruded, graphite type coating. Composed of chromium, manganese, and carbon. Possesses the ultimate in impact strength with good wear resistance.

WELDING CHARACTERISTICS

Exceptional weldability.
AC-DC application.
Dense deposits.
Freedom from surface checking.
Fast deposition rate.
Deposits forgeable at red heat.
Ideal for position welding.
Multiple deposits without slag chipping.

SIZES: Available COATED only in following sizes: 1/8", 5/32", 3/16", 1/4". Prices range from 50 cents to 75 cents per lb. depending upon rod size and quantity.

Write for free literature

Here's what enthusiastic users say about the new Stoody Self-Hardening 21 . . .

"Stoody Self-Hardening 21 used on cement mixer paddles and tamper heads is lasting twice as long as regular Self-Hardening. Very pleased with cost of application and way rod is going on."
Signed: M. H. Forbush, Foreman, Pollard Bros., Fresno, Calif.

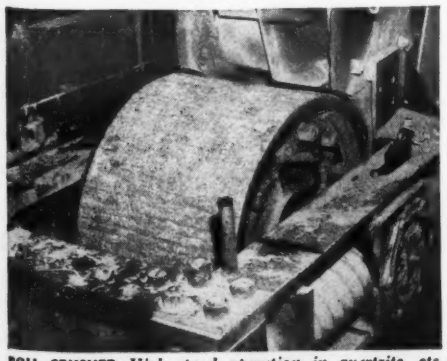
"We have been using Stoody Self-Hardening 21 for the past year on the top hammers of our Disintegrator on heavy industrial grinding operations. Our experience has been very satisfactory and we have found the rod easy to apply."
Signed: S. P. Wilson, Plant Engineer, Joseph Wagner Mfg. Co., San Francisco, Calif.

"We are now using Stoody Self-Hardening 21 as our standard crusher maintenance hard-facing alloy after comparing performance with alloys costing as much as $5.00 per pound. It not only performs better but provides a sounder weld when repeatedly applied. Stoody Self-Hardening 21 is the finest hard-facing rod yet developed for this type of work."
Signed: Harry Gravos, Welding & Crusher Maintenance Specialist, Spokane, Washington

"After two months test on pressure rolls crushing "Haydite" Stoody Self-Hardening 21 shows 50% better wearing qualities than competitive rod."
Signed: Adolph Schaad, Plant Sup't., McNear Brick Co., San Rafael, Calif.

"We ran careful tests on a number of hard-facing rods and found Stoody Self-Hardening 21 to have exceptional wear resistance, high rate of deposition and we have eliminated our former trouble with spalling after repeated applications. We always have more demand for roads than money to build them and the low cost of our hard-facing is a help to our budget."
Signed: D. E. Kirchner, King County Road District #2, Seattle, Washington

HARD-FACING ALLOYS ADD LIFE, CUT COSTS



ROLL CRUSHER—*High speed operation in quartzite, etc., chewed off former alloy in 24 hours. Stoody Self-Hardening 21 lasted a full week and does not spall even after repeated applications. Outperforms $2.00 per pound rods.*

6 YARD DIPPER—*Rebuilt on lips and bottom with 60 pounds of Stoody Self-Hardening 21. High abrasion resistance of alloy keeps bucket out to size. Alloy is redeposited as wear occurs to maintain operation.*

STOODY COMPANY
1156 WEST SLAUSON AVENUE
WHITTIER, CALIFORNIA
Distributors in all Important Industrial Areas

Gravel Road Replaced By Concrete Highway

(*Continued from preceding page*)

Concrete Batch Plant

In the meantime a concrete batch plant was set up at Junior, La., on a siding of the New Orleans & Lower Coast Railroad, about midway of the job. A plank roadway 1,500 feet long was laid at the plant, paralleling the siding track and also the highway. This service road was similar in construction to those leading in to the borrow pits. Thus the batch trucks entered the plant at the south end and backed under the Blaw-Knox 30-ton 2-compartment aggregate bin to pick up two batches of sand and gravel. Continuing along the plank service road they passed under a Blaw-Knox 200-barrel cement bin. With their contents covered by tarpaulins, the batch trucks then drove out of the plant at the north end to get back on the highway.

Sand and gravel for the concrete were furnished by Jahncke Service, Inc., of New Orleans, and shipped by rail from their plant to the siding at Junior. There the material was unloaded directly into the aggregate bin, or else placed in stockpiles by a Northwest crane with a 50-foot boom and a Blaw-Knox 1-yard clamshell bucket. Bulk cement was also shipped in cars from the Lone Star mill in New Orleans, and unloaded at the siding into a Blaw-Knox 300-barrel cement bin. The conventional worm gear under the track moved the cement to the enclosed elevator at the side of the bin where it was raised to the storage compartment.

An average of 15 trucks, holding two batches each, hauled the ingredients to the paver. About half of these were owned by the contractor, and the others were rented on a batch-mile haul basis. The average haul was 3 miles.

Forms and Joints

After the motor grader had shaped the sandy sub-base, the forms were set in 12-foot lanes with 9-inch forms at the side and 6-inch forms at the center. This conformed with the 9-6-9-inch pavement section, with the thickness decreasing 3 inches, from 9 to 6 inches, in the outer 3 feet. Both Heltzel and Blaw-Knox forms, totaling 3,500 feet, were used on the job. At least 500 feet of forms and grade was always prepared ahead of the paver. A Cleveland Formgrader cut the trench for the forms, which were tamped in place by a Cleveland form tamper. A Ben Flynn subgrader then rolled over the forms, removing any excess material and throwing it out to the side. All forms were set by hand, and 22-inch pins were used in the 9-inch sides.

Along the center form was a wooden keyway nailed to the steel. This was grooved out for holding the ½-inch tie rod which bonds the two 12-foot lanes together. These tie rods, 2 feet long, were set at mid-slab depth on 4-foot centers, with half their length in each slab. They were bent on the job, with the half length in the keyway held by a staple, and the other end, perpendicular to the form, supported on the subgrade by a forked wire chair.

A scratch template was pulled along behind the subgrader to give the grade a final check before it was rolled with a hand roller. Every 420 feet an expansion joint was laid out. This consists of a 1-inch cypress board, from 5¼ to 8¼ inches deep so that the top comes ¾ inch below the surface of the pavement. Through the center of the wood pass ¾ x 18-inch dowels on 12-inch centers. Five metal pins, driven into the ground with a sledge hammer, held the joint in place. Over the top was a light metal channel with 2-inch lips, with the top of the channel flush with the surface of the concrete. This channel was removed by the finishers when the concrete had attained its initial set.

C. & E. M. Photo

A Jaeger-Lakewood finisher levels concrete, followed by a longitudinal bullfloat.

The dummy or contraction joints are on 30-foot centers. They are similar in appearance to the expansion joints, without, of course, having the cypress board at the joint itself. The dowels are ¾ x 18 inches on 12-inch centers. The assemblies for both types of joints were furnished by Meadow Steel Products, Inc., of Birmingham, Ala., and were shipped to the job site by rail. The forms and the dowels in the joints were given a light coat of oil, and the subgrade was wet down prior to laying the concrete.

Laying the Pavement

Paving started at the batch plant and worked northwards to Myrtle Grove on the southbound lane, then reversed its direction to proceed south on the northbound lane back to the batch plant. In the next step, paving started at the south end of the job and moved north on the southbound lane to the batch

(*Concluded on next page*)

PRODUCTIVE INTERNATIONAL POWER Pays Profits

Grading 11.8 miles of farm-to-market roads required moving 205,000 yards of earth. Here's a job that demanded dependable, productive earthmoving power. Chosen for the task—six International TD-18 Diesel Crawlers, one International ID-9 Diesel wheel tractor, two International-powered graders and an International-powered self-propelled scraper.

Here's another example of what contractors are discovering every day—it's wise to standardize on International Power. It pays off in lower operating and maintenance costs and in *more work done in a shorter time.*

Discuss your earthmoving problems with your International Industrial Power Distributor. He'll show you how International tractors and International-powered earthmoving equipment will put more profits in your pocket on any earthmoving job.

Industrial Power Division
INTERNATIONAL HARVESTER COMPANY
Chicago 1, Illinois

The International UD-18A engine is the power plant in the TD-18 Crawler. This dependable Diesel is one of a line of six Diesel and four carburetor-type International Power Units. Whatever your power and equipment needs may be, specify International engines for all your requirements. Productive International Power is the key to greater profits.

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INTERNATIONAL

plant. The remainder of the northbound lane was then finished, working from south to north and winding up at the batch plant. In this way batch trucks did the minimum of hauling, and also availed themselves of a paved surface to ride on as soon as the concrete was opened to traffic.

Traffic was maintained at all times. This was not difficult when the new location was being paved, as the old gravel road was available for use. Then the paver worked outside the forms on both lanes. When space did not permit this arrangement, the paver moved inside the forms, and pulled a subgrade planer along behind it to remove the marks of the machine treads and to insure the proper cross section.

Batches were mixed a total of 67 seconds in a Koehring 34-E Twinbatch paver with a 30-foot boom. Water for the mix was supplied by four tank trucks—two of them holding 1,000 gallons each and the other two holding 500 and 750 gallons. A pump on the paver drew the water from the tanks through 50 feet of 2-inch hose line. These trucks also supplied water for wetting the subgrade and curing the concrete. Water was readily available either in the lake or from borrow pits that had filled up with ground water. Rex 4-inch pumps were set up at these locations in order to fill the tank trucks.

The weights of a typical 8-bag batch were as follows:

Cement	752 lbs.
Sand	1,690 lbs.
Gravel, ¾-inch	2,538 lbs.
Water	32 gals.

Concrete Finishing

The mixed batches were discharged on the subgrade in front of a Jaeger-Lakewood double-screed finishing machine. The concrete was then leveled off to within a little over 2 inches from the top of the forms. After several batches had been thus handled, the finisher backed up and steel mat reinforcement was placed on this initial lift of concrete. More batches were then dumped on top of the steel, and the upper 2 inches of concrete was leveled and smoothed off by the finisher.

Carried on the rear end of the finishing machine were the flat steel strips which the finishers pounded into the mix at the dummy joints as soon as the machine had passed. These steel strips of ¼-inch stock were 12 feet long and from 1½ to 2½ inches deep in relation to the different slab thicknesses. When these strips had been inserted, the surface of the concrete was gone over with a longitudinal bull-float. This consisted of a 2 x 8 timber, 15 feet long, moved diagonally across the surface by plow handles at the ends. It slid along on a four-wheel buggy which rode the forms, or one form and the adjoining slab after the first lane had been laid.

C. & E. M. Photo
Joe J. Atchison, left, was Superintendent for T. L. James & Co. on the Louisiana State Route 31 job. C. A. Labauve, right, was Inspector for the Louisiana Department of Highways.

The surface was next checked with 10-foot straight-edges by a finisher on each side. This was followed with a pass of the bow belt to smooth out any irregularities remaining. The belt was a four-ply fiber, a foot wide and 15 feet long. After the initial pass, the belt was again worked over the surface, this time in a diagonal movement to give a herringbone effect.

Then the finishers, working from their bridge, edged the transverse joints and also along the sides of the forms, and pulled the steel strips at the contraction joints and the caps at the expansion joints before the concrete had time to set up and harden. When the surface was dry, burlap was stretched over the concrete and kept wet for 24 hours. The burlap was then removed, and the concrete was covered with Sisalkraft paper for another 72 hours. The paper came in rolls of 75 feet, 12 feet wide.

Forms were removed the following day when the pins were taken out with a long-handled pin jack mounted on a two-wheel carriage. They were moved ahead on a flat-bed truck. After the concrete had completely cured, the dummy and expansion joints were filled with tar. The average day's run of concrete pavement was 2,000 feet of single 12-foot lane. This was for 10 hours. The best production, on April 7, totaled 3,025 feet of half-width pavement. The contractor worked 10 hours a day and 7 days a week.

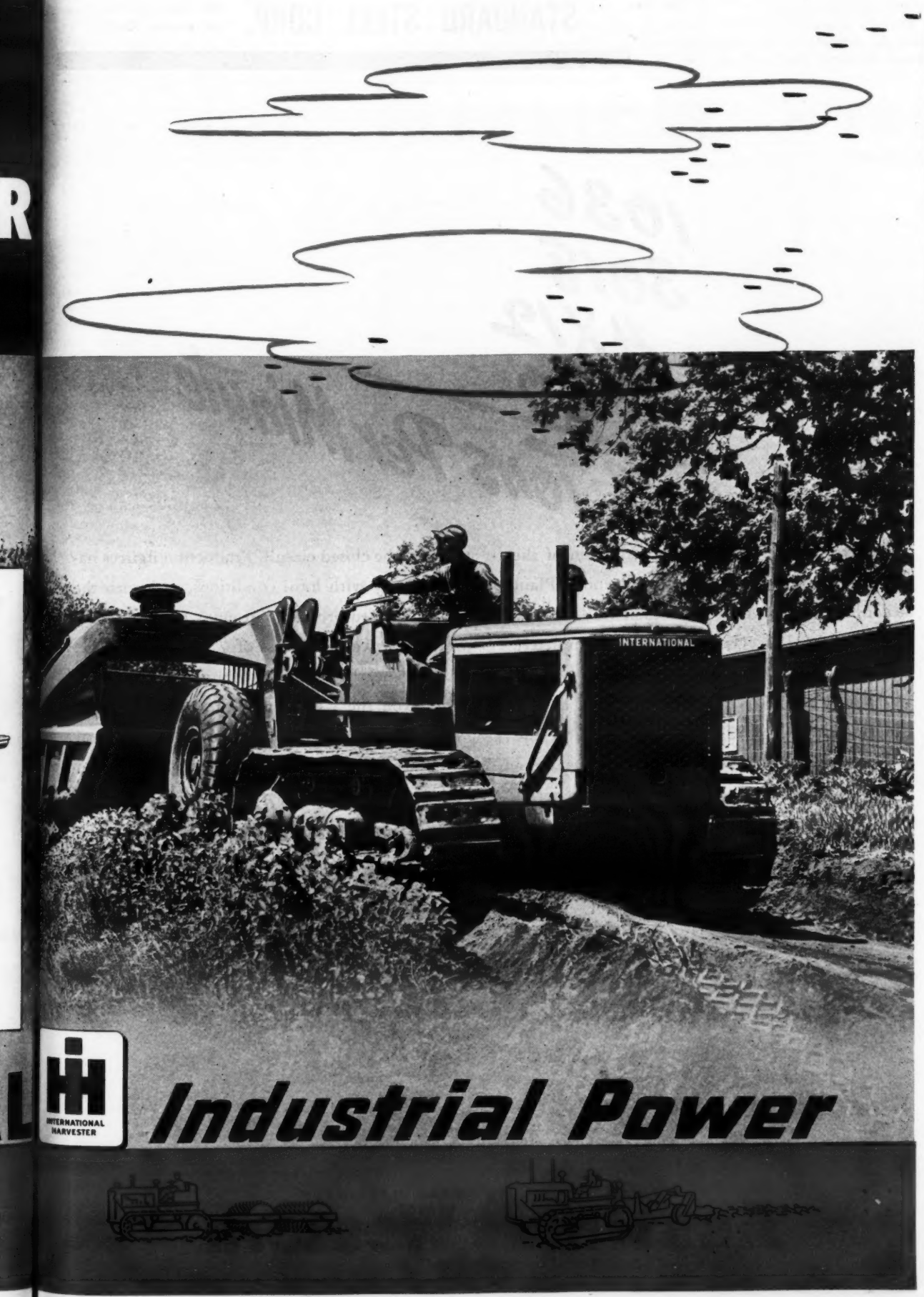
Quantities and Personnel

An average force of 125 was employed on this contract by T. L. James & Co., Inc., under the direction of Joe J. Atchison, Superintendent. Only a few of these men were skilled at the start of the job, as the bulk of the crew was recruited from local sources. With intelligent supervision, they soon rounded out into capable workmen, and gave a good account of themselves.

The major items in the contract included the following:

Common excavation	72,123 cu. yds.
Drainage excavation	12,244 cu. yds.
Borrow	192,729 cu. yds.
Reinforced-concrete pavement	147,822 sq. yds.
Reinforced-concrete culvert pipe, 18 to 30-inch	4,000 lin. ft.

For the Louisiana Department of Highways, Bruce Perdue was Resident Engineer, assisted by C. A. Labauve, Inspector. The project is located in the Marrero District of which Lester Corley is District Engineer. The Department is headed by R. B. Richardson, Director of the Department of Highways.



This combination bulldozer blade, made by the Northwest Tractor & Equipment Corp., can be used as a bulldozer, clearing blade, scarifier, and subsoiler.

Combination Blade Serves 4 Purposes

A combination bulldozer blade for use with Caterpillar D7 or D8 tractors is manufactured by the Northwest Tractor & Equipment Corp., 5800 E. Marginal Way, Seattle 4, Wash. It features replaceable teeth to permit its use as a bulldozer, as a clearing blade, for tree and stump removal, and as a scarifier and subsoiler. The slots for the 6 removable teeth are built as an integral part of the blade to speed installation of the teeth and to reduce maintenance costs.

The Model CD7 for the D7 tractor has a bowl height of 39 inches and a bowl width with blade and tips of 122 inches. The Model CD8 for the D8 tractor has a bowl height of 42 inches and a bowl width with blade and tips of 134 inches. Both units have a 43-inch maximum blade lift from the ground level to the bottom of the teeth, and a 57-inch blade lift from the ground to the bottom of the blade. Maximum blade drop below the ground-tooth level is 86 inches, and below ground-cutting edge, 72 inches. The CD7 weighs approximately 4,500 pounds; the CD8, 5,200 pounds. Both are cable-operated and have a reversible-type blade with replaceable end bits.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 95.

Listing of Special Gears

A 132-page listing of special gears in several styles has been made available by the American Gear & Mfg. Co., 5900 Ogden Ave., Chicago 50, Ill. These include spur gears; bevel and mitre gears; cut-worm and worm gears; nonmetallic gears made from rawhide, Fabroil, and Bakelite; spiral, helical, and herringbone gears; and racks, internal gears, and sprockets.

Catalog No. 50 presents detailed information on each of these special gears. It lists the sizes in which they come, the materials from which they are made, teeth per inch, pitch and outside diameters, and other information. The material is tabulated to simplify the use of the catalog as a reference manual.

A large section of the catalog is devoted to technical data and formulae connected with the use of gears. It lists weights and specific gravity of various materials, circumference and area of circles of various diameters in 1/64-inch intervals, fractions and decimal equivalents, chemical compositions of various steels, and other special gear information.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 123.

I-H Names Regional Mgrs.

Six Industrial Power Regional Managers have been appointed by the Industrial Power Division of the International Harvester Co. Jack Bess will handle the Northwest Region; E. L. Boughton, the Eastern; J. D. Gladden, Southern Region; R. H. Miller, Central Region; I. P. Payne, Southwest Region; and D. I. Persons, Western Region.

Frequency Stabilizer For AC or DC Welders

A high-frequency stabilizer for use with regular ac or dc welders is announced by The Hobart Bros. Co., Hobart Square, Troy, Ohio. According to the manufacturer, it increases the impulses from 120 to 4,000,000 per second. It was especially developed to adapt ordinary ac transformer welders for Heliarc welding. A special intensity control is provided so that the intensity of the high frequency can be adjusted to suit the particular job at hand.

Among the uses which Hobart recommends for the stabilizer are these: in inert-gas-shielded tungsten electrode welding; in sheet-metal and similar work involving low currents; in vertical and overhead welding; and with a twin-carbon-arc torch. It is available in two sizes with maximum capacities of 300 and 500 amps.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 53.

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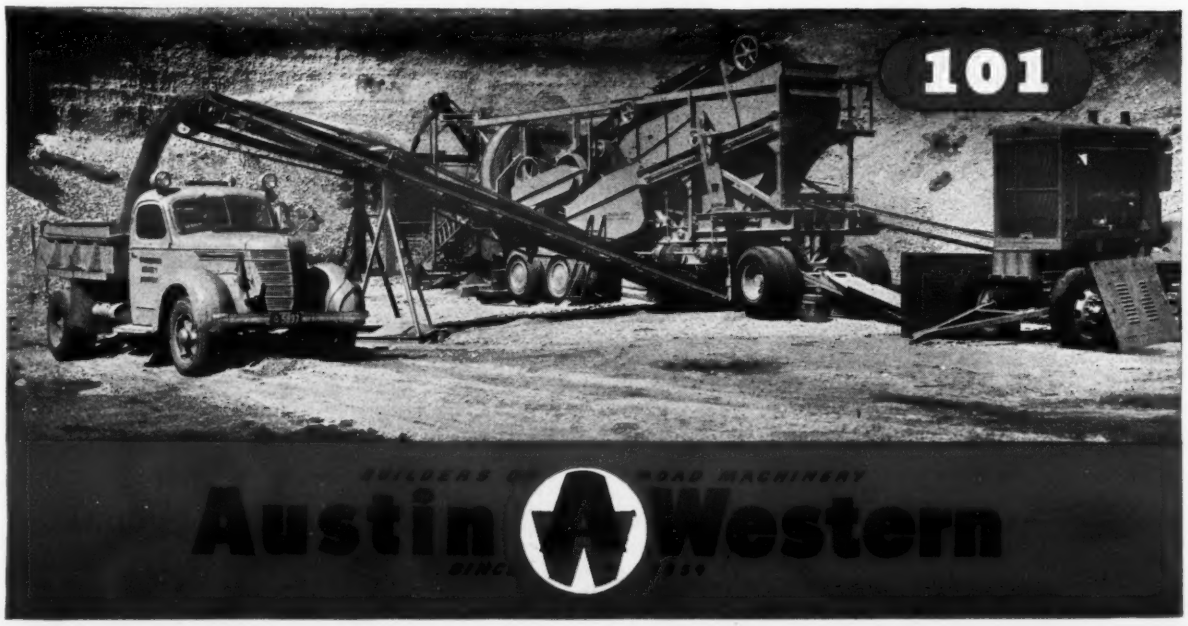


New Marginal Docks Will Help Ship Traffic

Port Expansion Program Includes 3 More Wharves And Transit Shed; Drive 1,500 Concrete Piles

By WILLIAM H. QUIRK,
Eastern Editor

✦ FACILITIES at the Alabama State Docks, port of Mobile, are being expanded in a $4,000,000 program which includes three new marginal wharves and a paralleling transit shed. This will increase the capacity of the State Docks from 22 to 25 ships. Construction of the new docks got under way early this year, and it is expected that shipping will be using these facilities by the end of 1949. Known as berths 6, 7, and 8, the combined length of the new wharves along the Mobile River is 1,535 feet. The construction is under the sponsorship of the Alabama State Docks and Terminals, a Department of the State of Alabama. The work is being supervised by J. P. Ewin, Inc., Engineers-Contractors of Mobile, as consultant.

Following record-breaking wartime traffic at the port of Mobile—what with lend-lease, UNRRA, and military shipments—a feared falling-off of shipping did not materialize after the war. In fact, many new records in the handling of cargoes were established during 1947. Tonnages over the docks increased 23 per cent over 1946 to set an all-time high in earnings.

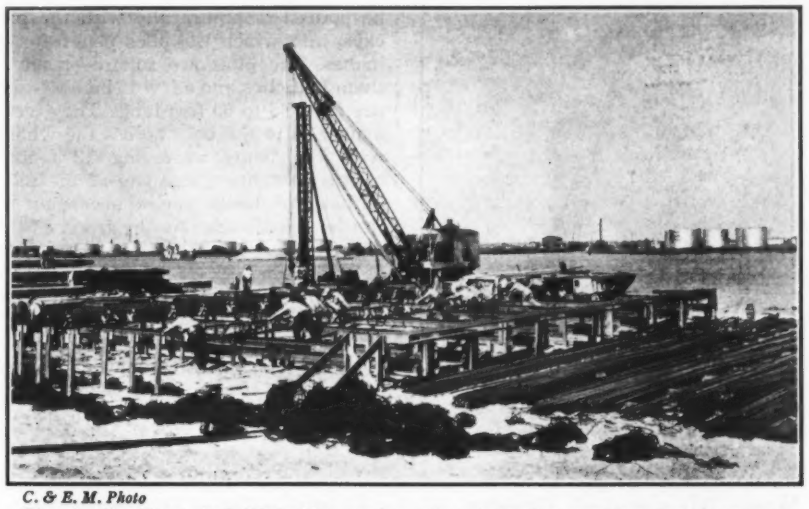
The increase in vessels docked during 1947 at State Docks facilities was 20 per cent over 1946. A look at the docks' figures for last year shows that 928 vessels were docked; 103,006 freight cars were handled; and the tonnage handled amounted to 4,053,775. This resulted in the all-time high of $3,663,-021.56 in gross earnings for the fiscal year, with a net revenue of $1,806,783 before depreciation and interest.

The docks have continued to grow, and the volume of business has increased steadily since they were built in 1928 at an original cost of $10,000,000. Additions and improvements have brought the total outlay to approximately $12,000,000. The increasing volume of business handled by the docks in recent years has made further expansion necessary. The expansion plan is being financed by the sale of bonds.

New Docks

The new docks are on the right or west bank of the Mobile River, north of the business section of the city and the Bankhead vehicular tunnel that crosses under the river. They are south of the highway bridge carrying U. S. 90 over the river. They are immediately downstream of the existing docks which are known as A, north and south; B, north and south; and C, north and south. The existing docks are of the slip type, about 1,600 feet long, and are nearly at right angles to the river. The new docks are marginal construction running parallel to the river from just south of pier A to Adams Street. There is still room for future expansion southward to Dauphin Street.

(*Continued on next page*)



C. & E. M. Photo
Here in the Espy steel-fabrication yard, a pile reinforcing cage has just been completed. Men have lifted it off the fabrication rack and are sliding it along on rails to the far end of the storage racks. The pile-driving rig is in the background.

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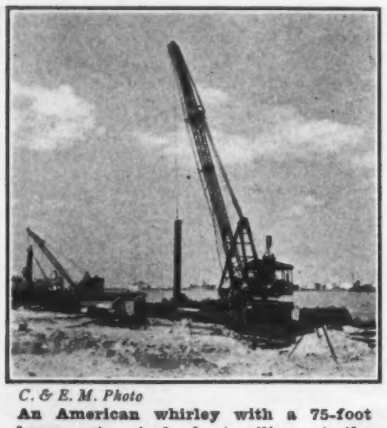

C. & E. M. Photo
An American whirley with a 75-foot boom sets steel sheet piling at the rear of the new wharf of the Alabama State Docks.

New Marginal Docks Will Help Ship Traffic

(Continued from preceding page)

This 1,535-foot marginal wharf consists of berths 6, 7, and 8, numbered from south to north, with a slight curve at the upper end. Three of the largest types of ships using the port can tie up at the new pier. The wharf, when completed, will be 66 feet wide and will consist of a concrete deck slab supported on reinforced-concrete piles, with a cut-off wall of steel sheet piling at the rear or land side of the structure. In front it will be protected by timber fender piles. The wharf is 11 feet above the level of the river, which has been dredged to a depth of 33 feet out to the channel.

A steel transit shed, 200 feet wide, will run the length of the wharf, with its front elevation 31 feet back from the river face of the dock. The shed will thus be partially supported on the wharf and partially on the fill behind it. It will have a concrete floor extending out 25 feet behind it in the rear to a four-track layout 52 feet wide. Beyond the tracks, a 40-foot road will also serve the wharf and shed. In addition to the rail connection at the rear of the shed, two tracks may also be laid along the wharf in front of the shed. On the inside, the transit shed will have a 20-foot vertical clearance.

The thickness of the concrete deck slab will vary from 8 inches under the shed to 17 inches out in front, where it may have to support the weight of tracks and heavy trains. The deck will be poured monolithically with the pile caps, into which the piles penetrate 12 inches. The piles are square—most of them 18 inches, and a few 16 inches—and are from 45 to 60 feet long. They were driven 10 to the bent across the wharf, with the bents averaging 12 feet 6 inches on centers. Spacing of the piles within the bents varies according to the imposed loads. At the front of the pier, where the slab is thicker because of the proposed trackwork, the piles are close together. Under the shed, where less-heavy loads will be encountered, the spacing is as great as 10 feet 4 inches. At alternate bents, a couple of additional batter piles were driven to take up the thrust of the fill behind the cut-off wall.

Preliminary Work

Originally, the site of the new wharf was occupied by six old piers and a bulkhead of the Gulf, Mobile & Ohio Railroad which had been superseded by new railroad facilities elsewhere along the river. These old slips extended back about 400 feet from the river, and saw some service during the last war by the Army and Navy. They were also used for the temporary tie-up of cargo vessels. The City of Mobile acquired this land, and demolition of the old docks got under way in March, 1947, and was completed that July. Piles 75 years old were pulled out; concrete slabs were

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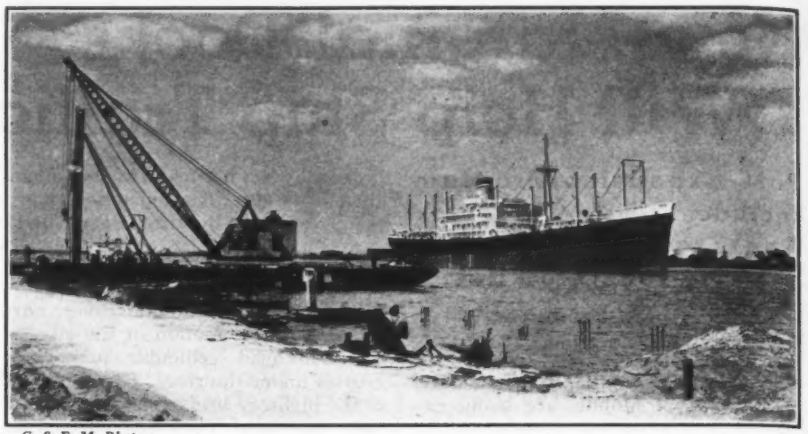

C. & E. M. Photo
As a Wiley 80-foot-boom whirley drives a 16-inch square concrete pile on the Espy contract, the Rhodesia Star—a baby flat-top converted to a cargo vessel in a shipyard up the river—sets out into Mobile Bay on her maiden voyage.

SEALTEX is applied on many road construction projects. Here is a typical state highway application.

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broken up and removed; and the old bulkhead was taken away. A molasses line, still in service, was shifted to another pier.

After this work was completed, a contract was awarded for dredging 741,085 cubic yards of sand from the river, and filling in the existing old ship berths. The dredging was done 100 feet out from the proposed face of the new wharf, and to a depth of 50 feet below the water level. As the sand was pumped into the old slips, the soft mud on the bottom slid out from under, to fill up the cuts made by the sand excavation.

Several storm sewers flowing to the river were cut off by this new hydraulic fill, but they were diverted by an intercepting ditch dug along Commerce Street which parallels the river. This ditch emptied into the Mobile at a point below the dredging operations. A levee was thrown up along the river side of the ditch to retain the sand fill in the location where it was needed. The dredging started in September, 1947, and was completed that December. Any shoals remaining in the river were then removed by dredging to a depth of 33 feet below low water.

Two Dock Contracts

Contracts were then awarded for the construction of the marginal wharf. The project was divided into two sections. The lower or southern section, 1,024 feet long, comprises berths 6 and 7 with a fire wall at each end, and was awarded to the Espy Paving & Construction Co. of Savannah, Ga., on a low bid of $900,117. Berth 8, 511 feet long, adjoining to the north, went to Foster & Creighton Co. of Nashville, Tenn., on a low bid of $634,763.

The work to be performed by both contractors was similar in nature, but their methods and procedures had some variations. Concrete-pile casting and driving was one of the chief items in the contracts, with 1,000 piles required in the upper section and 500 in the lower. Both companies made use of the wide stretch of filled-in land behind the wall as a work area for assembling and fabricating the steel reinforcing-rod cages for the concrete piles. There also the pile-casting yards were laid out. Both companies purchased truck-mixed concrete supplied by two local concerns —the Radcliff Sand & Gravel Co. and the Underwood Coal & Supply Co. The average haul to the job site from their plants is 3 miles, which took from 15 to 20 minutes. When piles were being cast, from three to five truck-mixers were employed, each holding 3 cubic yards of concrete.

High-early-strength cement was used in the pile casting; this permitted the removal of forms in five days and the driving in seven days. For the piles, 4,000-pound concrete was specified, while for the deck superstructure 3,000-pound concrete was considered strong enough. The proportions by volume of the concrete used in the pile work were 1 : 1.94 : 2.61. A cubic yard of concrete took 6.58 bags of cement. For each bag of cement 5.46 gallons of water was added to the dry weights of the ingredients; the slump averaged 2 inches. The weights of a cubic yard of concrete were as follows:

Cement	619 lbs.
Sand	1,380 lbs.
Gravel, 1-inch to No. 4	1,575 lbs.
Water	36 gals.

An access road and a railroad spur in to the job site served to supply both contractors with the materials of construction. Steel reinforcement, a sizable item, was shipped to both jobs via the Southern Railway line from the Truscon Steel Co. plant at Birmingham, Ala.

Espy Contract

The Espy Paving & Construction Co. set up a sturdy timber and steel rack, waist-high, alongside its steel yard for the assembly of the pile reinforcing cages. The rack was 65 feet long, to accommodate cages for pile lengths of 45, 50, 54, 55, 56, 57, and 60 feet. The top cross timbers on the assembly rack overhung the vertical posts on each side so that two cages might be assembled at the same time. After a cage was assembled, with the hoops tied securely

(*Continued on next page*)

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New Marginal Docks Will Help Ship Traffic

(*Continued from preceding page*)

to the long vertical steel rods, it was lifted by hand from the assembly rack and placed on the storage-rack platform right alongside. This involved the minimum amount of steel handling as the rods were picked up from the storage yard, placed on the assembly rack, and when assembled, lifted off onto the storage-rack platform.

The latter consisted of eight 40-pound rails, 50 feet long, supported on timbers so that their heads were 18 inches off the ground. Their spacing was strung out to accommodate the longest piles. The cages were easily shoved along on the rails by the steel workers who assembled them. Their alternate corners were welded for additional supporting strength. A crane then picked up the cages, and put them on a flatcar which moved them a short distance to the pile-casting yard where they were placed in the forms. The cages weighed about 2,000 pounds each, and twenty were carried at a time on the flatcar. Crane work at the yard was handled by a Lorain with a 75-foot boom.

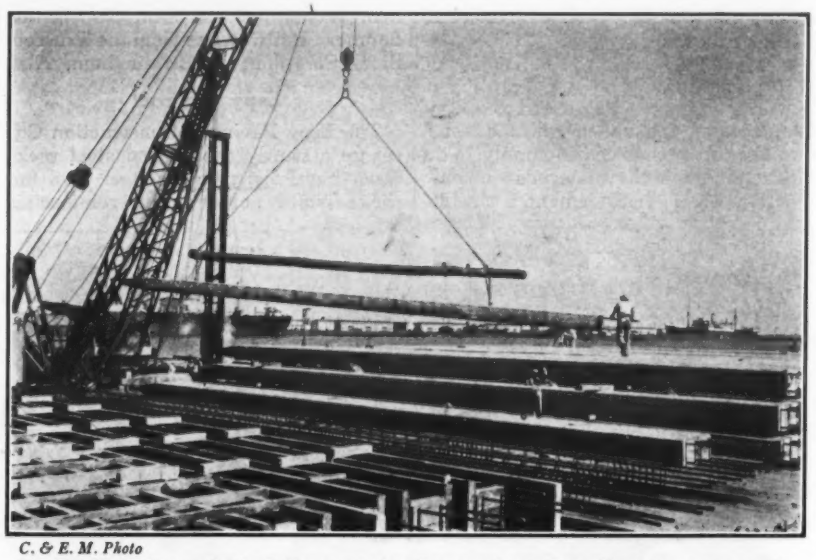
At the pile-casting yard, three beds were laid out to hold 33 piles each. The floor consisted of 1 x 6's supported on 3 x 8 joists spaced on 15-inch centers. Any unevenness of the ground was taken care of by shimming up with a small amount of concrete spotted along at about 1-foot intervals. Side forms were of ¾-inch stock backed with 2 x 4 studs on 15-inch centers, with other 2 x 4's running along both bottom and top of the side panels. Across the top of these paralleling forms the bracing consisted of long 2 x 4's notched out to fit over the side forms. They were placed on 2½ to 3-foot centers.

Concrete was discharged from the truck-mixers into wheelbarrows, and then emptied into the forms. Before the concrete had set up, two 12-inch eye bolts were embedded in the top side for use later as lifting points. The concrete was cured with MasterKure which was sprayed on the sides after the forms were removed.

Once a row of piles had been poured in a bed, using alternate forms, the space between, which was the same size as a pile, was filled with concrete for the casting of more piles. This eliminated practically all the form work once the job got under way. Bonding of concrete to concrete was prevented by covering the sides of the adjoining piles with two layers of paper separated by a film of asphalt. This permitted them to slide. The outer sides of the paper were coated with a cold-water paste made of wheat straw. In this way from 12 to 18 piles could be poured in a day.

Sheet-Pile Cut-Off Wall

The Espy sequence of operations on the job went something like this. The back row of vertical concrete piles, the batter concrete piles on alternate



C. & E. M. Photo

To distribute the weight of the concrete piles evenly and avoid stresses or cracks during handling, Espy hung this timber-pile stirrup pick-up from the boom of the Lorain crane. Cables dropped from the timber pile were attached to eye bolts embedded in the side of the concrete pile.

bents, and the steel sheet piling were driven as part of the first operation. Then, while the concrete cap was being poured on top of the sheeting, the remaining wharf piles were driven. Work on the deck followed next.

A subcontract for driving the steel sheeting at the rear of the wharf was given to the Ernest Construction Co. of Mobile. The U. S. Steel Corp. plant in Birmingham supplied the M-115 sections, 18 inches wide and 20 feet long. Driving was done from the subcontractor's No. 4 floating rig—a steel barge, 30 x 90 feet, on which was mounted an American whirley with a 75-foot boom and an oil-burning steam boiler. No leads were used with the McKiernan-Terry 9B hammer. This row of sheeting is topped with a concrete cap 3 feet 9 inches wide x 2 feet 4 inches deep.

Driving the Concrete Piles

Extreme care was exercised in handling the concrete piles so as to distrib-

(*Continued on next page*)

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or cause time out

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Hayward Buckets

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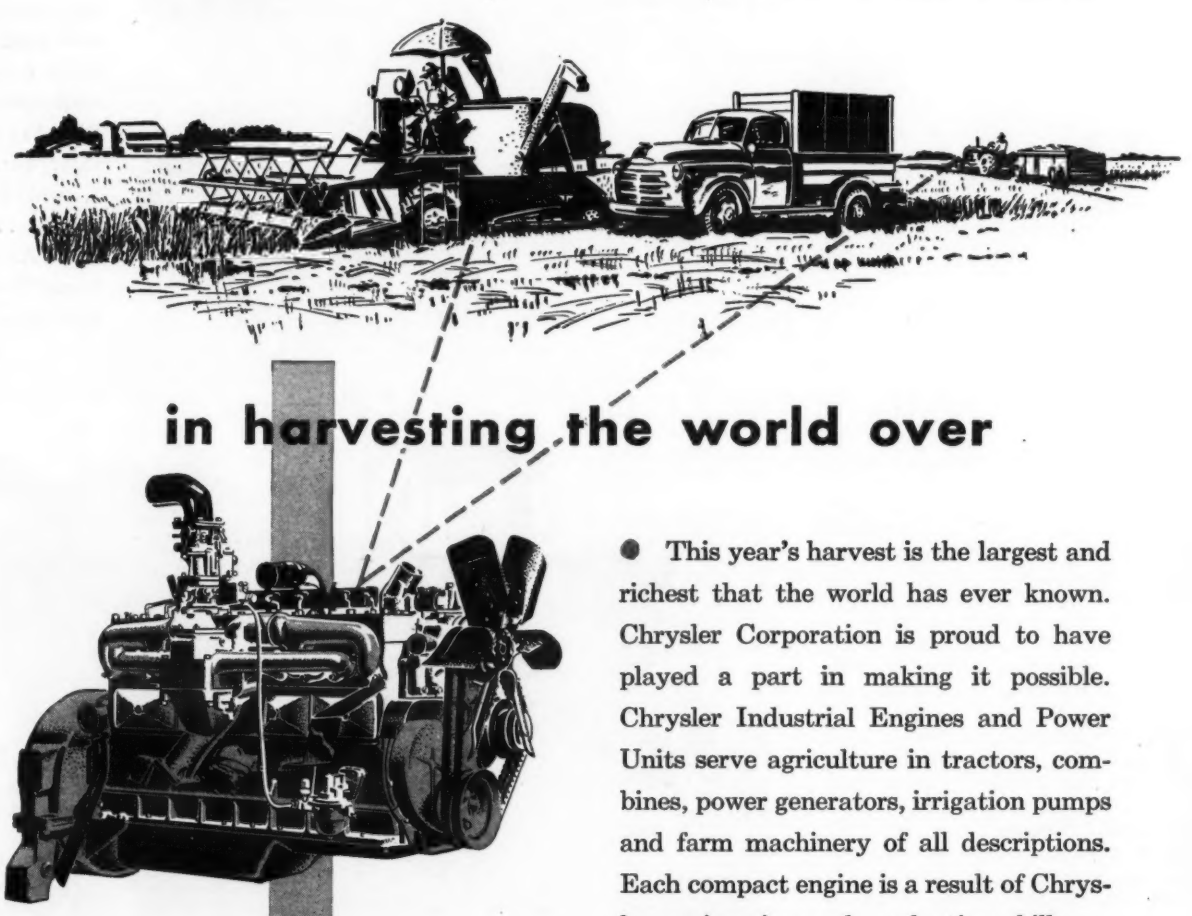

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INDUSTRIAL ENGINE DIVISION, CHRYSLER CORP., 12200 E. JEFFERSON, DETROIT 31, MICH.

ute their great weight evenly and to avoid cracking or breaking them. From the boom of the Lorain crane hung a stirrup pick-up consisting of a 10-inch timber pile, 30 feet long, from which two cables were dropped. These were attached to the 1½ x 12-inch eye bolts embedded in the side of the concrete pile. The crane loaded the piles onto a flatcar from the casting yard. The car ran down the temporary track to a point not far from the edge of the river. There the piles were transferred, again by the same crane, to a 34 x 90-foot storage barge.

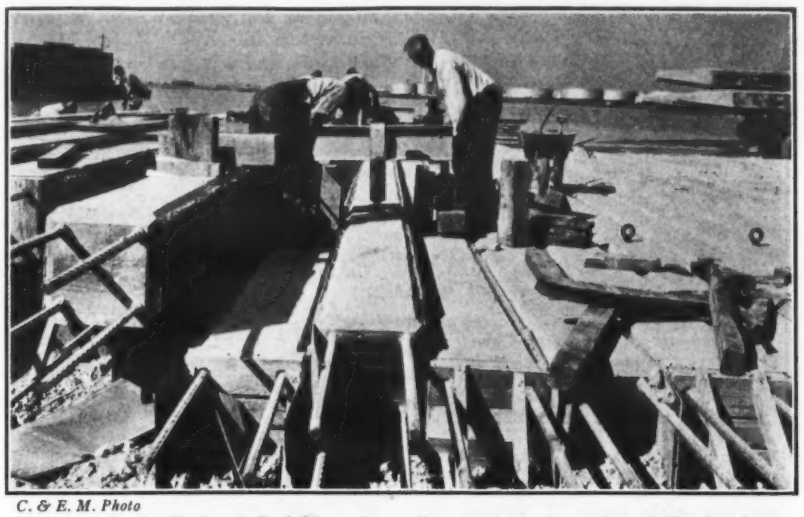
Concrete piles on the Espy contract were driven from a 34 x 96-foot steel barge tied to deadmen up on the bank, and maneuvered by its hauling engines on the deck. On the barge was mounted a Wiley 25-ton oil-burning whirley equipped with an 80-foot boom. This rig picked the piles up from the storage barge and fitted them into the 50-foot steel leads which were braced by an A-frame. A Vulcan No. 1 hammer drove the piles to 40-ton bearing in the sandy bottom of the riverbed. A Jaeger 4-inch jet pump provided water for the jetting process which accompanied the driving.

In this contract the concrete piles were actually 3 feet 4 inches longer than required. After the piles were driven, a paving breaker removed the concrete for that distance from the top, so that the four steel rods could be bent over to tie in to the deck slab. The single row of back piles was driven. Then the batter piles were driven at the rear of the alternate bents on a batter of 7 horizontal to 12 vertical. This was followed by driving two full bents of piles at the south end of the job.

This was enough to give line to the timber template with which the rest of the concrete piles were driven. The template was strongly constructed with one member, made of 8 x 8's and 10 x 10's, extending from the bulkhead, or back of the wharf, out to the front. At right angles to this main piece were other timbers, 4 x 16's mostly, held together by 1-inch bolts. The piles to be driven framed within these cross timbers. All the remaining piles were driven in this manner from the floating rig.

Foster & Creighton Contract

Foster & Creighton Co., on its portion of the project, cast an average of 18 concrete piles per day in a yard with



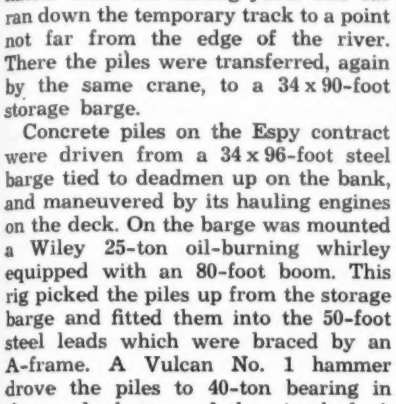
C. & E. M. Photo

Workmen in the Foster & Creighton pile-casting yard use two pairs of Simplex jacks to lift a pile to the level of the one at the left. Two layers of mastic, with grease in between for easy sliding, prevent bonding of adjacent piles.

accommodations for 133 piles. A carpenter shop for form work was set up, equipped with a DeWalt 12-inch-blade table saw. The floor of the pile bed was made from 2-inch lumber supported on 3 x 8's set on 2-foot centers. They in turn rested on small blocks of wood which were adjusted to the proper grade level by tamping or filling underneath. The side forms consisted of ¾-inch stock braced with 2 x 4's on 18-inch centers. On this contract the steel reinforcing rods were left projecting from the top of the pile, and were driven that way with the hammer head coming down on the pile in between the rods. A cushion block consisting of a 1-inch layer of Celotex was placed next to the concrete, followed by a 2-inch lift of gum wood. This also served as the end piece of the forms, with holes left for the steel to come through.

Side forms were required only once, for as soon as the alternate piles in one row were cast, they served as forms for casting the piles in between. The sides of the piles already in place were covered with two layers of mastic separated by a film of grease so that the concrete would not bond. For lifting

(Concluded on next page)



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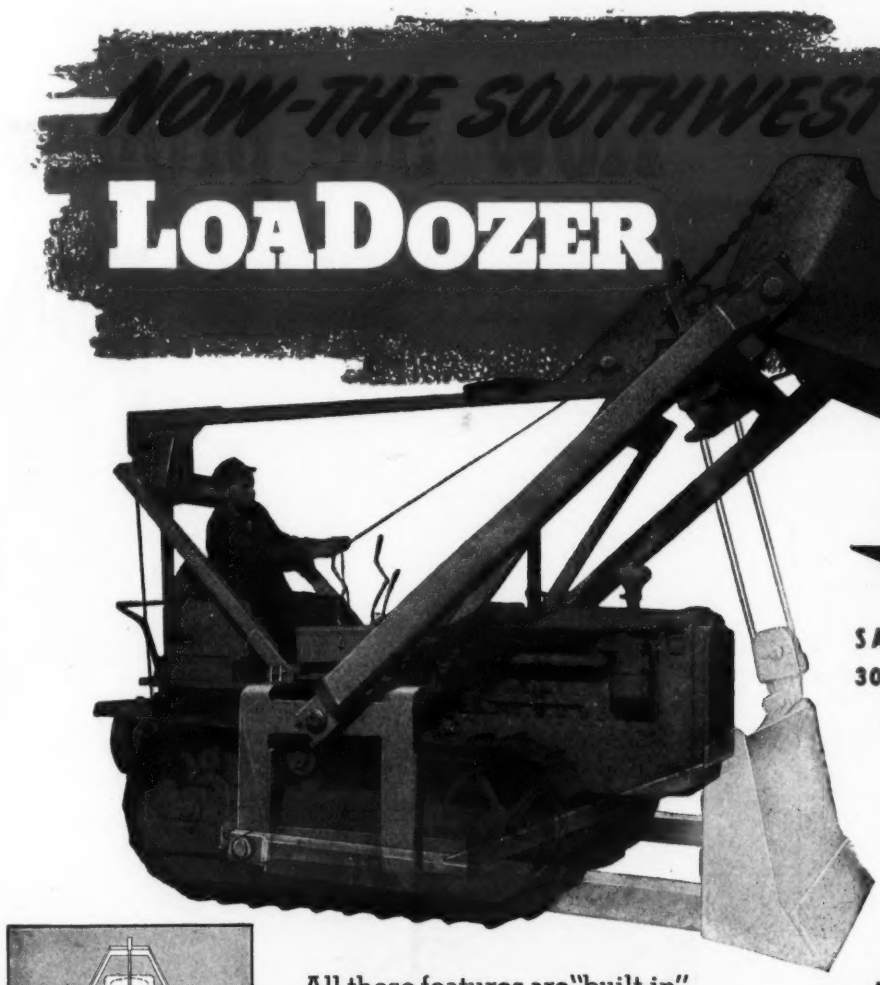

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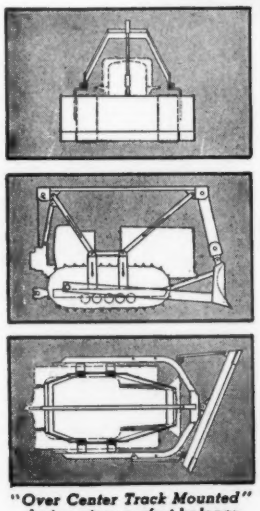

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ANOTHER EXAMPLE OF *Southwest's* LEADERSHIP

CONSTRUCTION MACHINERY DIVISION

Southwest Welding & Manufacturing Co.

ALHAMBRA, CALIFORNIA

New Marginal Docks Will Help Ship Traffic

(*Continued from preceding page*)

points, two Richmond anchor bolts were embedded in one face of the pile at the time of the pour. The anchor bolts were later backed out and replaced with 1-inch eye bolts, 18 inches long. The eye bolts were recovered before the piles were driven, but the steel threads remain in the concrete. Kapco compound was used for curing the concrete.

The steel cages in the assembly yard were handled by a Link-Belt Speeder crane with a 60-foot boom, while the heavy piles were lifted around by a Lima 90-foot-boom crane. In the big yard the latter crane could not boom out directly over the piles, and furthermore there was danger of cracking the piles if they were lifted in that manner. So alternate piles were raised from the level of the pile bed with jacks, and set on 4 x 4's which were stretched across the piles left on the floor. Jacking was done with two Simplex 30-ton hydraulic jacks at the sides of each of the two eye bolts. Two channels back to back over the pile were raised by the jacks, and at the same time raised the pile through a connection to the eye bolts. The jacks were moved 7 inches at a time; then timbers were placed under them to get more height. Three different moves of the jacks were required to get them up to the desired level.

Floating Pile Driver

Once the piles were lifted free, the Lima crane placed them on flatcars, and then transferred them to a storage barge. Foster & Creighton Co. sublet the pile driving to Bernard & Byrd Co. of Mobile which used a floating pile driver mounted on a 50 x 130-foot steel barge. The double-moonbeam rig has 84-foot steel leads, a 45-hp oil-burning boiler, and a three-drum hoist. Driving was done by a Vulcan OR hammer accompanied by jetting from two 3-inch jet pipes, 60 feet long, with 1½-inch nozzles at the ends. Water for the jetting was pumped from the river by 3-inch jet pumps.

Driving started at the north end of the job and continued to the south end, with the rows of piles kept in line by means of two transits, one on shore and the other on a platform hung from the bents. All the piles were driven from the floating rig, with the exception of the concrete batter piles and the steel sheet piling which were driven with land equipment.

Deck work followed the pile driving, with the wooden forms hung from friction connections on the piles. Concrete for the deck slabs will either be pumped to place, or placed by a system of conveyors.

As work progresses on the wharf contracts, the Rust Engineering Co. of Birmingham, Ala., will construct the 200-foot-wide transit shed.

Quantities and Personnel

The major items in the two contracts for the concrete-pile wharf section include the following:

Item	Espy Paving	Foster & Creighton
Excavation	5,000 cu. yds.	3,000 cu. yds.
Steel sheet piling	20,900 sq. ft.	16,800 sq. ft.
Concrete piles, 18-inch	52,500 lin. ft.	33,120 lin. ft.
Concrete piles, 16-inch	8,600 lin. ft.	4,550 lin. ft.
Concrete	4,400 cu. yds.	3,000 cu. yds.
Steel reinforcing	700,000 lbs.	460,000 lbs.

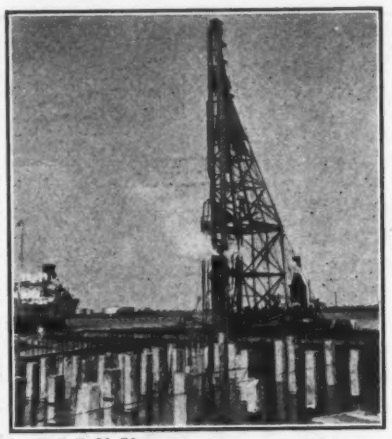
Job personnel for the Espy Paving & Construction Co. of Savannah, Ga., includes F. B. Carson, Superintendent, and T. C. Patten, Assistant Superintendent. For the Ernest Construction Co., subcontractor on the sheet piling, J. P. Trotter was Superintendent, and H. S. Nelson, Assistant Superintendent.

Foster & Creighton Co. of Nashville, Tenn., is represented by Curtis M. Babb, Superintendent. For the subcontractor, Bernard & Byrd Co., Charles M. Andry was Superintendent, and Charles C. Davis, Jr., was Engineer.

From 250 to 300 men have been employed on the entire project by all the contractors involved.

For J. P. Ewin, Inc., the consulting engineering firm which is directing the construction, Truman A. Smith is Resident Engineer, assisted by N. S. Bradberry, Field Engineer, and Henry Hiden, Jr., Chief Inspector.

Henry W. Sweet is Director of the Alabama State Docks and Terminals, and James E. Folsom is Governor of Alabama.



C. & E. M. Photo

Bernard & Byrd, subcontractor to Foster & Creighton, drives an 18-inch concrete pile in a wharf bent at the Alabama State Docks. A Vulcan OR hammer works in 84-foot steel leads on the floating pile driver.

Cement Co. Sales Changes

Winfield H. McDowell has retired as Sales Manager of the Kansas City territory of the Universal Atlas Cement Co., a subsidiary of the United States Steel Corp. Mr. McDowell has been with the company for 37 years, and held his present position for the last 14. He is succeeded by Harold J. Layden, who has been District Sales Manager at St. Louis for the last 4 years. W. Troy Gaunt has been named to succeed Mr. Layden.

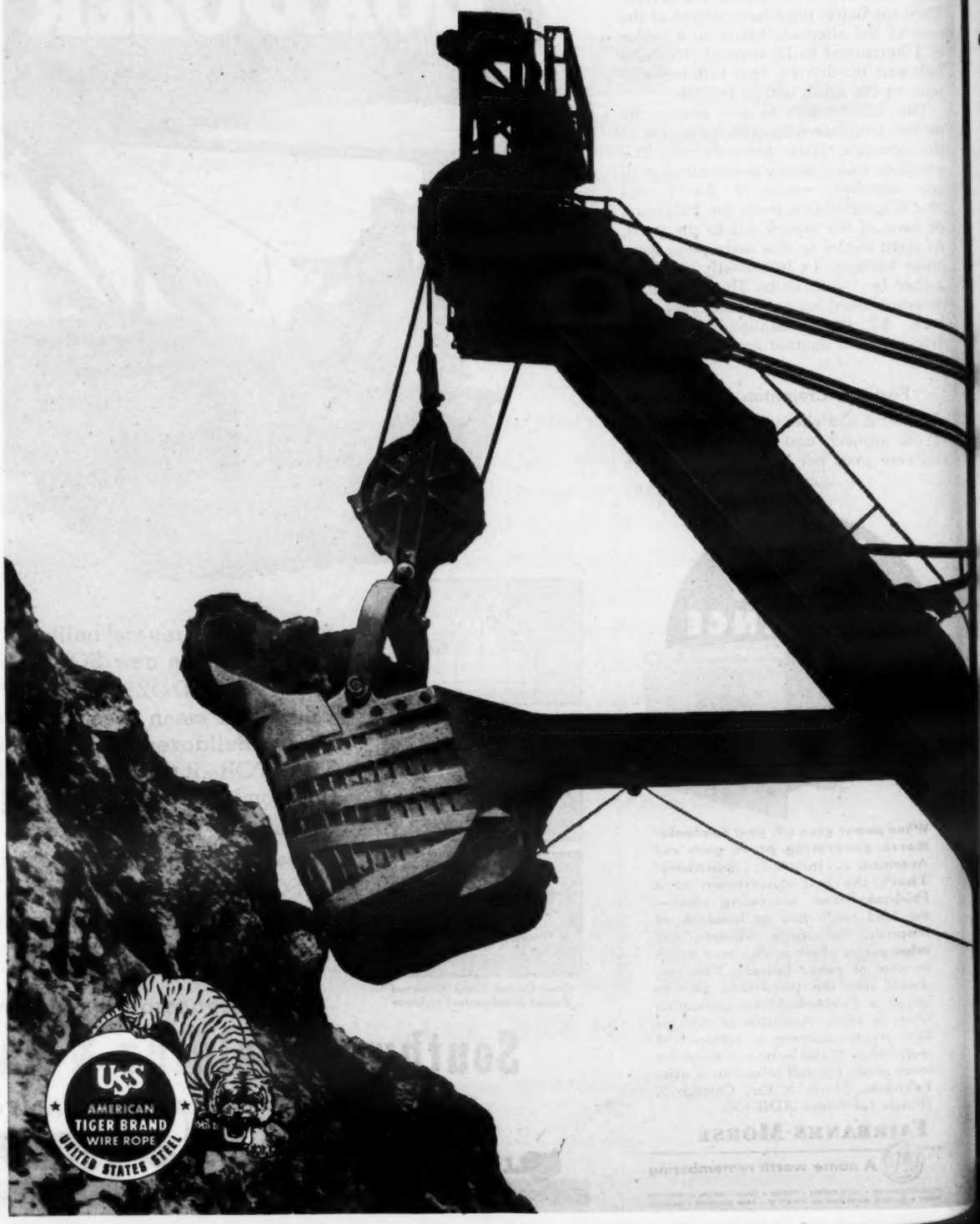
Versatile Dozer Described

A folder on the uses and features of the Imp Dozer is being distributed by Oliver Corp., 19300 Euclid Ave., Cleveland 17, Ohio. The bulldozer, made by A. C. Anderson, Inc., Wildwood, N. J., is built with a universal-type mounting frame and is designed as accessory equipment for use with Cletrac Model HG tractors. The catalog features a description of the wide variety of uses for the tractor-dozer unit. Other attachments include a trail-builder blade, snow plow, hydraulic draw bar, front-end loading bucket, tilting blade, and others.

The folder tells how the Imp Dozer adapts itself to each type of job. It illustrates the universal mounting frame, and contains complete specifications for the bulldozer and Trailbuilder blades when mounted on either the HG-31 or HG-42.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 38.

How the proper application of



Air-Driven Breaker

A 70-pound paving breaker is announced by the Independent Pneumatic Tool Co. of Aurora, Ill. The Thor No. 24 has an overall length of 28 inches, a net weight of 70 pounds, and a ¾-inch hose inlet-pipe thread. The chuck size for collared steels is 1¼ x 6 inches, with an optional 1⅛ x 6-inch chuck size.

Among the features claimed for the No. 24 are the Thor floating valve; fast, positive action with a minimum of friction; increased number of blows per minute; air cooling of the back head; and the Thor block-type piston.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 98.

Motor Graders at Work

A 16-mm full-color sound moving picture has been prepared by the J. D. Adams Mfg. Co. Entitled "Adams All-Purpose Motor Graders", it shows this equipment at work on a wide variety of road construction, road maintenance, and miscellaneous grading jobs. It also shows the Adams rotary snow plow at work on an Adams motor grader, as well as V-type plow-and-wing snow-removal work.

The film can be seen by contacting any Adams distributor.

Did you see these exact miniatures of road-construction giants at the Timken Roller Bearing Co.'s display at the Road Show? The four working toy models, made by The Charles Wm. Doepke Co., reproduce a Jaeger concrete mixer, a Barber-Greene bucket loader, a Wooldridge earth hauler, and an Adams road grader.

Kids Will Take Over; You Dads Can Retire

Yes, siree, Dad, the kids will finish up all the work you've contracted for with *real* working models of that equipment that cost you so much money. Of course, it might take them another 3,943,796 days—exclusive of Saturdays and Sundays—to complete it, but who will still be interested by then, anyhow?

The working models are manufactured by The Charles Wm. Doepke Mfg. Co. of Rossmoyne, Ohio, and are exact replicas of the Adams motor grader, Barber-Greene bucket loader, Wooldridge earth hauler, and Jaeger concrete mixer. The toys are built of heavy-gage steel, electrically welded, and have real Goodyear rubber tires or rubber track-type treads.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 60.

Machinery Trailers

Two trailers have been added to the line of equipment made by The Cleveland Trencher Co., 20100 St. Clair Ave., Cleveland 17, Ohio. The Model T-6 has a 6-ton capacity and the Model T-10 a 10-ton capacity. Among the features claimed for both units are 4-wheel electric brakes, a break-away safety switch, a tongue eye designed to accommodate most pintle hooks, safety chain, 2-inch hard-wood flooring, and others.

Equipment is front-loaded by removing the front axle-and-tongue assembly. Or narrow-gage machinery—58 inches or less—can be rear-mounted by loading between the wheels. Overall length of both models, including the front wheel-and-tongue assembly, is 23 feet 9 inches. The bed width is 7 feet 10 inches. Overall width of the Model T-6 is 8 feet; of the T-10, 7 feet 11 inches. The bed of the T-6 is 23 inches above the ground; the bed of the T-10 is 24 inches above the ground. The T-6 uses eight 7:00 x 20 tires and has an approximate weight of 4,200 pounds. The T-10 uses eight 8:25 x 20 tires and has an approximate weight of 5,000 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 8.

Soil Loads on Clay Pipe

A 28-page booklet about computing soil loads on underground clay pipes has been prepared by The Robinson Clay Products Co., Second National Bank Bldg., Akron 9, Ohio. This booklet of trench-loading tables is designed to provide a means of pre-determining loads and strength requirements for clay pipe.

The tables show the estimated load according to pipe sizes ranging from 6 to 36 inches in diameter; trench depth and width; and backfills of sand and gravel, saturated topsoil, dry clay, and wet clay. These loads are computed for materials which weigh 100 pounds per cubic foot. If the materials weigh more or less than this figure, the actual load can be quickly determined as a percentage of the given figure.

The booklet also lists the minimum supporting strength of standard-strength and extra-strength clay pipe for various types of installation—free laying, tamped backfill, concrete cradle, and pipe encased in concrete.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 26.

Marion Shovel Promotions

Shifts in personnel have been made by the Marion Power Shovel Co. David E. Rizor is promoted to the position of Assistant to the Vice President in Charge of Sales. He is succeeded as District Manager of the Chicago office by C. M. Gegenheimer. A. W. McGraw takes over the St. Louis office.

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5. Loads handled.
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8. Lubrication.
9. Corrosion.
10. Amount of scrubbing and abrasion.
11. Fitting attachments.
12. Abuses to be corrected.
13. Analysis of service records.
14. Finally: Recommendation of the correct rope to meet all conditions.

To show you how you can save money on wire rope, we have prepared a booklet on proper wire rope application that every user of wire rope should read. You can get a copy by mailing the coupon.

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Highway Officials Meet At AASHO Convention

Baldock and MacDonald Urge States to Step Up Volume of Road Building To Carry Present Traffic

✦ CHALLENGED by a six-point demand for the immediate enlargement of road-building activities, more than 1,000 registered delegates and guests to the 34th annual meeting of the American Association of State Highway Officials heard highway progress criticized from almost every angle. The six-point program for better progress was contained in the annual report of retiring President R. H. Baldock, Chief Engineer of the Oregon State Highway Department, which he delivered before the Association in Salt Lake City on September 19.

The assembled delegates heard Baldock call for the following measures to bring the highway program up to date:

1. Speedier contracting of highway projects and improved organization of the state highway departments in the several states to handle not less than $2,000,000,000 worth of Federal-Aid highway work annually.

2. The promotion of a completed study of road and street needs of each state, and of an adequate highway taxation plan to meet such needs in a reasonable time and with relation to benefits received. Property owners and the general public should help to pay the cost of highways.

3. A survey of state systems and the deletion of unimportant local roads so as to apply more funds to the construction of heavily traveled main highways.

4. The increase of salaries in the highway departments and the formulation of plans to interest colleges, universities, and students in the training of highway engineers.

5. Better selling of highway activities to the general public, through improved public relations.

6. The expansion of activities of the AASHO, with added staff members.

MacDonald Defends Federal Aid

The Commissioner of Public Roads, Thomas H. MacDonald, echoed the views advanced by the outgoing President in his address. Defending the Federal-Aid program, MacDonald quoted statistics from the Public Roads Administration to support his claim that Federal-Aid costs were not excessive. At the present rate of spending, he said, Federal Aid costs only $3.42 per capita per annum in the nation, less than the price of a stick of chewing gum each day.

Calling on all states to accelerate the contracting status of highways now planned, MacDonald also warned that road builders across the nation are still trying to substitute maintenance for construction, and he called for an informed public opinion to demand highways faster.

MacDonald also sounded a sober note when he told of the strategic importance of highways in case of war. The new concept of industrial defense strategy in case of war, he said, is adequate space between plant units, with units connected by roads. In addition to new construction badly needed in this regard, many of the older highways need rebuilding, and lack of such construction, he said, is retarding the development of the country.

Baldock had previously shown that the AASHO is falling far short of studies for highway needs, and that the contract showing has not been impressive. Only 34 per cent has been earned by contractors from the available funds, and another 18 per cent is under contract with no pay money earned.

Hon. Will M. Whittington, from Mississippi, Member of the House Sub-Committee on Roads, warned the assembly that Federal-Aid funds might be cut in future economy moves, unless highway departments demonstrate their ability to use Federal moneys already appropriated, and to use those funds intelligently and wisely.

Highway safety was the subject of a talk by Hon. Philip B. Fleming, Administrator of the Federal Works Agency. The national accident rate is down somewhat from last year, Fleming said, but the death toll on the nation's highways is still so alarming that a far greater reduction must be made.

(*Continued on next page*)

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WITH HIGH AMPLITUDE

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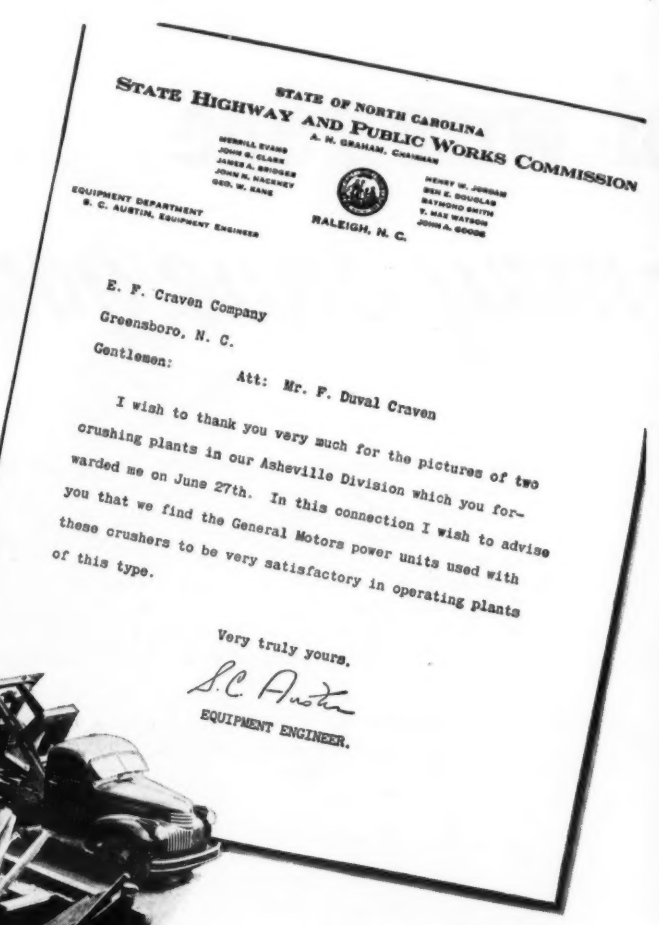
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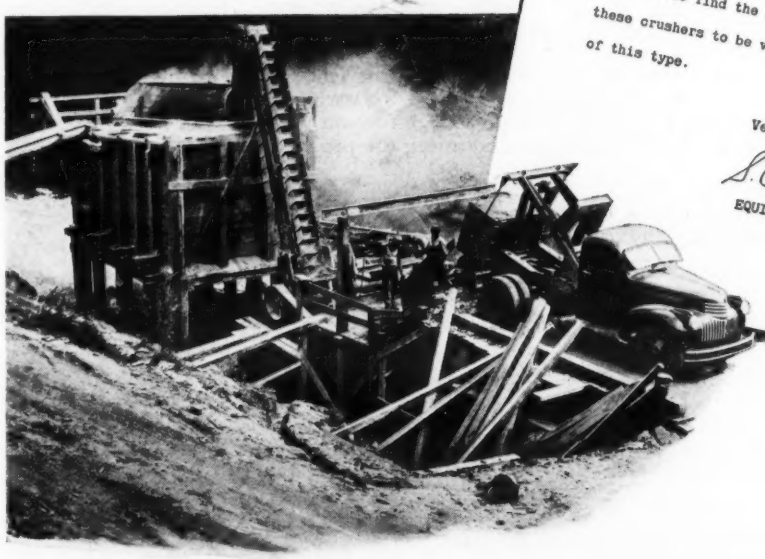
E. F. Craven Company
Greensboro, N. C.
Gentlemen:
Att: Mr. F. Duval Craven

I wish to thank you very much for the pictures of two crushing plants in our Asheville Division which you forwarded me on June 27th. In this connection I wish to advise you that we find the General Motors power units used with these crushers to be very satisfactory in operating plants of this type.

Very truly yours,
S. C. Austin
EQUIPMENT ENGINEER.



This rock-crushing plant at Weaverville, N. C., is one of two the North Carolina State Highway Department powers with six-cylinder Series 71 General Motors Diesel engines.

Cuts Fuel Costs 75%

Sounds unbelievable, doesn't it? But that's just what happened when the North Carolina Highway Department's rock crusher at Weaverville was converted from gasoline to General Motors Diesel power.

Look at the records! To produce 300 tons per day, with the original engine, 55 to 60 gallons of gasoline were needed. Since converting to GM Diesel power in 1946, fuel consumption has dropped to 30 gallons of Diesel fuel a day. This alone amounts to a cost saving of approximately 75%. Add to economy the advantages of dependable steady operation, easy maintenance and instant response to varying power demands and you'll see why the plant foreman says, "Best power I ever saw. It's a dandy."

For economy, efficiency and versatility, the best answer to your power problem is a General Motors Series 71 Diesel engine. Write today for the complete story.

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Maintenance Takes the Spotlight

Highway maintenance came in for more discussion, perhaps, than at any other time in the 35-year history of the AASHO. In a general-session panel discussion, chief engineers and commissioners from all over the country analyzed road maintenance from A to Z. The panel was moderated by R. H. Baldock of Oregon, assisted by J. S. Bright of the Washington Office of the Public Roads Administration.

In an all-day meeting of the Maintenance Committee two days later, valuable details of highway maintenance were aired in prepared papers. Standardized lighting of snow-removal equipment was discussed by W. H. Root of Iowa and J. E. Lawrence of Massachusetts. C. L. Motl of Minnesota told how his state prevents pavement damage from excess loads. Maintenance organizations were discussed by P. A. Morison of Maryland.

Utah's method of visual education for personnel training was explained by Chief Engineer Roy W. McLeese, and a comprehensive and far-reaching report on maintenance personnel was presented by Missouri's maintenance engineer, Rex M. Whitton.

Secondary-road maintenance, the use of radio-telephone in maintenance work, safety measures at mail-box turnouts, and other topics were covered, and a round-table discussion of general maintenance followed the prepared papers. Highway upkeep promises to occupy a spot of more and more prominence on the Association's agenda as time goes on.

Resolutions Passed

A number of resolutions concerned with present and future highway construction were passed by the Association.

First, it reaffirmed its action of a year ago in again urging each state which has not already done so to undertake the development of a long-range comprehensive highway plan.

Second, it urged special, positive action to expedite the currently authorized construction program. Four subpoints were made. The resolution suggested that highway engineers ascertain the factors that are retarding progress, and that they apply all possible corrective measures. The immediate establishment of an adequate salary scale for state highway employees was urged, as was the adoption of a sound personnel policy affording opportunity for assured advancement with retirement benefits. Highway departments were also urged to maintain contact with colleges and universities in order to encourage students to select highway engineering as a profession.

Third, the Association pioneered what may be a new trend in highway financing by declaring its belief that the burden of highway construction and maintenance should be fairly borne by highway users, property owners, and the general public, substantially in proportion to the benefits which each receives.

Fourth, it recommended to the various state legislatures that they investigate all possibilities of providing increased revenues for highway work.

Fifth, it urged that Federal laws be amended to provide for the construction of bridges in reservoirs, where bridges on dams are not believed feasible.

A revision in maintenance for secondary and feeder roads built under 49 Stat. 1519 was asked, to relieve the states of present maintenance procedure on this type of road. Another resolution pledged cooperation in studying the national highway system with a view towards national defense. Highways on Federal power reservations, bridges over waterways, and additional radio facilities for highway maintenance were also subjects of AASHO resolutions.

AASHO-AGC Committee Meets

At a meeting of the Joint Cooperative Committee of the AASHO and the Associated General Contractors, highway engineers learned that good competitive bids are now being received in almost all sections of the country for both primary and secondary-system projects.

Of $1,600,000,000 worth of construction work under way with Federal Aid at this time, only 0.7 of one per cent is being carried on with day labor. All the rest is being done by the competitive contract system. On jobs $50,000 and smaller, the number of bids averaged 4.5 per project, graduating upward to the jobs $1,000,000 and over, where 7.4 bids per project were received on an average.

A. N. Carter, AGC's Co-Secretary, pointed out to the Association that even better bids would be received if the state highway departments would prepare their construction programs enough ahead of time so that contractors knew the total volume of various work to be carried out for a season. This practice, several states have already found, encourages the contractors to assemble adequate plant and personnel, and prevents the contractors from leaving a given state to work in adjoining states. Producers of material, too, have sometimes expanded their production facilities to meet this sort of program.

Many states reported that opening jobs of varied sizes and types at a given letting was adding more interest to each letting, and that it resulted in an increased number of bids for each job.

The generally unsatisfactory progress of highway construction was discussed, and according to statistics of the PRA, 18 per cent of the jobs were found to be definitely slow. The various reasons for unsatisfactory progress,

(*Concluded on next page*)

The MOORHEAD Portable Aggregate Drier

is used on numerous types of work where it is the purpose to heat and dry materials preparatory to mixing. The material is thrown or discharged into the hopper and thoroughly dried and heated in traversing the length of the trundle by the intensely hot flame of the burner.

The unit is sturdily constructed and may be attached to any vehicle. Drier has a capacity of from 5 to 10 tons per hour. Furnished with electric motor and on skids for stationary use.

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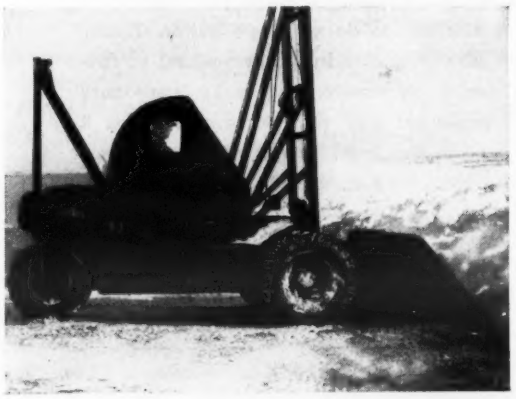
IS EASIER WITH SCOOPMOBILE



Visibility from inside cab is good—windshield swipes are standard equipment, and heaters are available.

Scoopmobile, with a level bucket load capacity of 1.08 cubic yards, can easily scoop snow and load the average truck in two minutes. Cab model provides added comfort for the operator, resulting in greater efficiency, reduced man hours. Weight of the machine is centered over driving wheels (single or dual as desired) for *positive traction*. Dozer Blade and other attachments available.

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Road Officials Meet

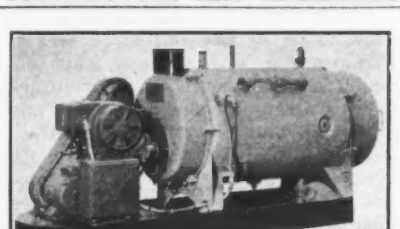
(*Continued from preceding page*)

from the contractor's viewpoint, were labor difficulties, equipment problems, slow material deliveries, poor management, and adverse weather.

New Officers Elected

New officers to head the affairs of the American Association of State Highway Officials for the coming year were announced on September 24, 1948, when the meeting adjourned. W. W. Polk, Chief Highway Engineer of the Illinois Division of Highways, was chosen President, with Carl W. Brown, Chief Engineer of the Missouri State Highway Department, as First Vice President.

Regional Vice Presidents elected for the coming year are: Spencer Miller, Jr., of New Jersey; W. Vance Baise of North Carolina; C. M. Ziegler of Michigan; and Al F. Winkler of Montana. Hal H. Hale continues in his role of Executive Secretary.



Two sizes of this new Cleaver-Brooks hot-water generator are available—one with an output of 550,000 Btu's, and one with an output of 730,000 Btu's. They come in oil or gas-fired models.

Hot-Water Generator

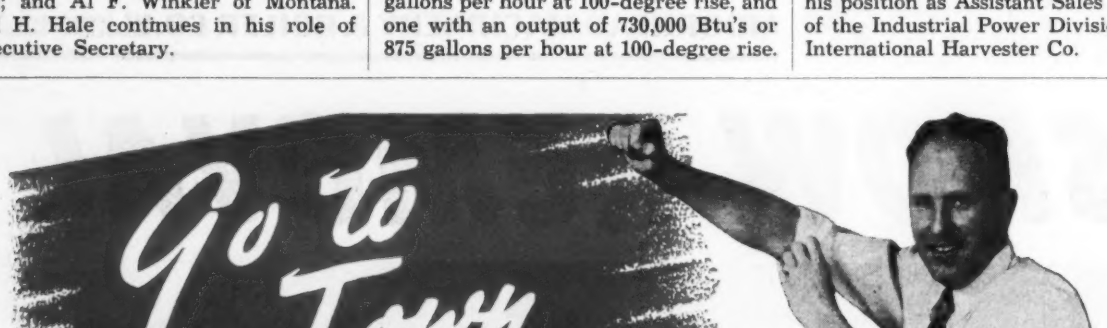
A high-capacity hot-water generator for use in construction jobs, concrete block plants, and asphalt plants has been introduced by the Cleaver-Brooks Co., 333 E. Keefe Ave., Milwaukee 12, Wis. It is available in two sizes: one with an output of 550,000 Btu's or 665 gallons per hour at 100-degree rise, and one with an output of 730,000 Btu's or 875 gallons per hour at 100-degree rise. The new units are completely automatic and available in either oil or gas-fired models.

Among the features claimed for the Cleaver-Brooks heater are 4-pass construction, a hinged rear door for accessibility in cleaning and maintenance, a vent for carrying away exhaust gases, the use of a forced-draft burner, and industrial-type safety controls. The large unit is 113 inches long, 44 inches high, and 26½ inches wide. The front end of the base, including the burner, can be removed for separate handling if desired.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 25.

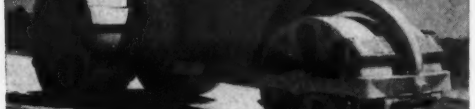
Gilbertson Joins Hough

G. A. Gilbertson has joined the Frank G. Hough Co. of Libertyville, Ill., as Vice President. He recently resigned his position as Assistant Sales Manager of the Industrial Power Division of the International Harvester Co.



With HUBER ROAD MACHINERY

THE HUBER MAINTAINER



THE HUBER 3-WHEEL ROLLER

THE HUBER 3-4 TON TANDEM ROLLER

Smart road men know the advantages of putting Huber road machinery on their toughest road jobs. After several operations you'll be surprised at Huber's speed . . . efficiency . . . and ability to really take it, to say nothing of Huber's proven economy of operation.

These Huber characteristics are the results of over 35 years experience in the road machinery field. During these years Huber has paid particular attention to the needs and demands of reliable road men—a practice which has enabled Huber to give you machinery more suited to all road operations.

Size up the scope of your road work and let your Huber distributor help you specify a Huber machine to do your job better. Huber rollers are available in either 3-wheel or tandem models in sizes from 3 to 14 tons—more than ample for any road assignment. For a real "ace in the hole" you can't beat the versatile Huber Maintainer. It's a bulldozer, lift-loader, patch roller, berm leveler, snow plow, or rotary broom all in one. It's a "must" for highway departments and other maintenance units. Write today for bulletins describing the Huber road machinery which most interests you.

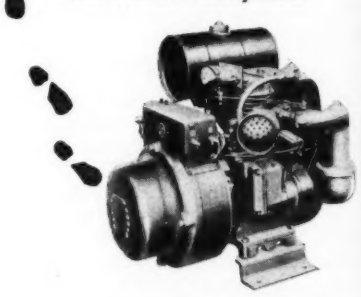
THE HUBER MFG. COMPANY • MARION, OHIO, U. S. A.

HUBER 3 Wheel • Tandem ROAD ROLLERS and MAINTAINERS

NO MORE LIGHTING PROBLEMS FOR ME!

On small and medium size jobs I've found the answer to lighting problems with a compact "General" generating set.

Gas engine driven and ruggedly built, these "General" sets are my ideal where up to 2000 watts are required.



Models available from 300 to 2000 watts, either AC or DC.

For the "General" set to solve your lighting problems, send for a complete catalog today.

DEALERS: Exclusive territories now open. Write —

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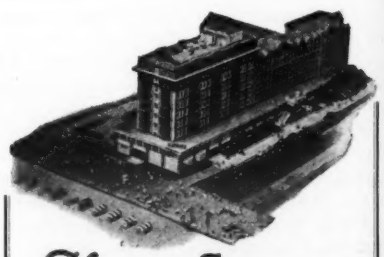

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ATLANTIC CITY'S HOTEL of DISTINCTION

Devoted to the wishes of a discriminating clientele and catering to their every want and embracing all the advantages of a delightful boardwalk hotel.

Spacious Colorful Lounges—Sun Tan Decks atop—Open and inclosed Solaria—Salt Water Baths in rooms—Garage on premises. Courteous atmosphere throughout.

When in Atlantic City visit the
FAMOUS FIESTA LOUNGE
RENOWNED FOR FINE FOOD

OPEN ALL YEAR
Under Ownership Management
Exclusive Penna. Ave. and Boardwalk

Tar-Mulch Pavement Reduces Road Costs

Mixed-in-Place Mat Laid On a Gravel Foundation For 19.6 Miles of Road In Allegany Park, N. Y.

A LOW-COST yet satisfactory pavement for the type of light passenger-car traffic which uses state parks has been constructed on a 19.6-mile loop road in Allegany State Park, N. Y. The park is located in Cattaraugus County in the western part of the state, and is bordered on the south by Pennsylvania. The longest dimensions of the park are roughly 10½ miles north and south, and 16 miles east and west. Before this improvement, the existing road was either shale or dirt, with a variable width of 18 to 24 feet.

The section which has been reconstructed is now at least 20 feet, with additional widening of 2 to 4 feet on the curves. The 9½-inch gravel base is topped by a 2½-inch mulch of tar and graded gravel. On top of this pavement is a seal coat of tar and gravel.

A contract for the construction was awarded by the New York State Department of Public Works, Albany, N. Y., to the Warren Bros. Roads Co. of Cambridge, Mass., on its low bid of $376,501.80. Wet weather delayed the job considerably. Then, too, almost the whole 19.6 miles of road was well shaded by large trees which prevented the sun from breaking through and drying out the ground after a rain. The contract was divided among the three following roads which form a large loop inside the park:

Quaker Run Road	5.5 miles
Big Red House Road	7.9 miles
English Stoddard Road	6.2 miles
Total	19.6 miles

Gravel Foundation Course

The alignment of the existing road was followed closely, but some cuts were made for the sake of better sight distances, and to reduce some of the sharper curves. This excavation was done in part with the four tractor-dozers on the job: one Caterpillar D8, two D7's, and one International TD-14. The balance was done with a P&H 1½-yard shovel and a Northwest ½-yard shovel loading to trucks. Shoulders 4 to 6 feet wide on a slope of ½ inch to the foot completed the new roadbed, while the slopes vary between 1 on 1¾ and 1 on 3. All ditches are a foot wide.

Right after the grading came the laying of the gravel foundation course which was put down in two lifts of 4½ and 5 inches respectively, bottom and top. Run-of-bank gravel was specified, the maximum size being 4 inches, with the material coming from one gravel pit within the park area, and one pit outside the park. The pits were worked by two different excavators: a Lorain 1-yard dragline, and a Northwest Model 31 ¾-yard shovel. Gravel moving was done with a fleet of 20 trucks rented on a yard-mile basis from Staffen Bros. of Grand Island, N. Y. The hauls averaged from 2 to 12 miles. Only light trucks carrying a maximum load of 3 yards were used on hauls within the park proper, since the roads are designed for passenger-car use only and not for heavy trucking.

The gravel was put down on half the width of the road at a time so that traffic would not be held up. Maintenance of traffic, in fact, was the other big factor, besides rain, that plagued the contractor during the summer. When it was not raining, the park was always well patronized by tourists. To keep them moving, a stretch of 500 feet on one side was first spread with gravel, shaped, and rolled, and then the adjoining half of the road was brought up even with the first portion.

A Caterpillar No. 12 motor grader

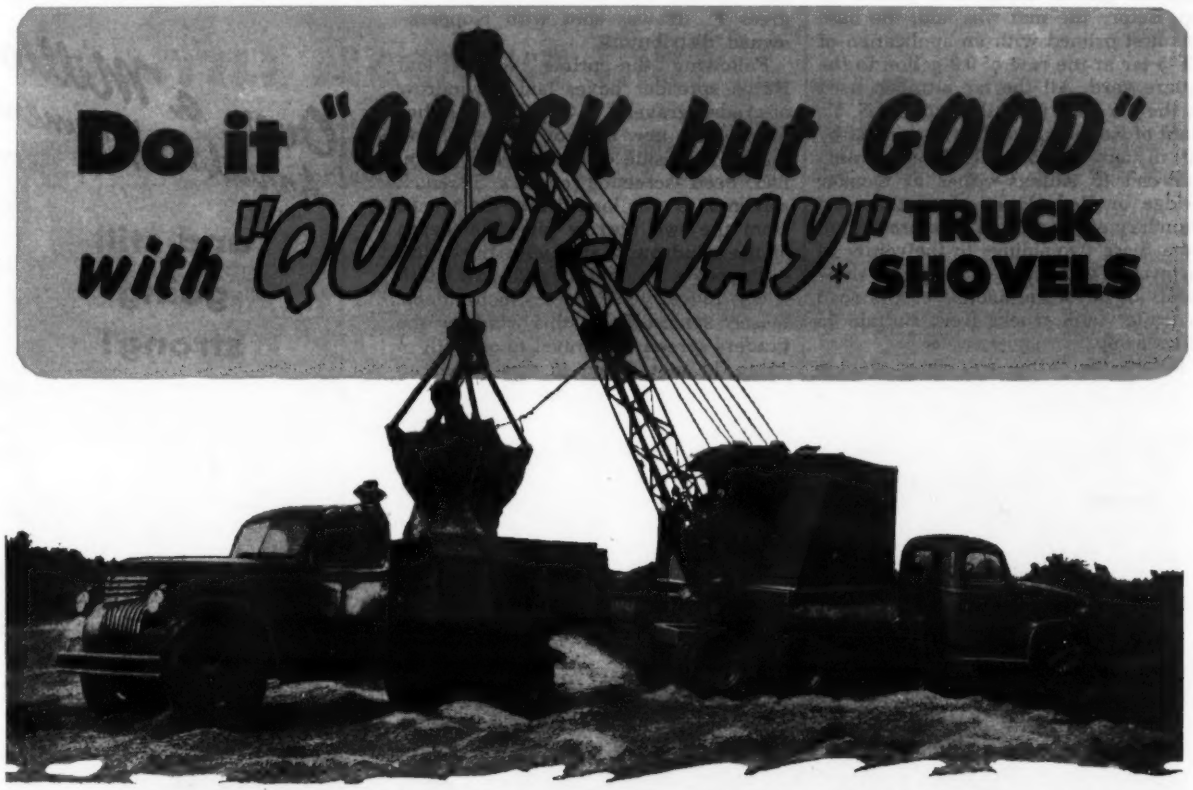
(*Continued on next page*)

C. & E. M. Photo

Gravel for the Allegany Park road is transferred to a Chevrolet from an Autocar supply truck pulling a Fruehauf trailer, since the 18 to 20-ton load is too heavy to pass over the park roads. The roads are designed for passenger-car use only.

For Over 70 Years Builders of Fine
WHEEL BARROWS:
AMERICAN
STEEL SCRAPER CO.
Sidney, Ohio

Do it "QUICK but GOOD" with "QUICK-WAY"* TRUCK SHOVELS



Whatever the job, a *"QUICK-WAY"* will do it both QUICK and GOOD. What's more, a *"QUICK-WAY"* will move to the next job and be hard at work in record time.

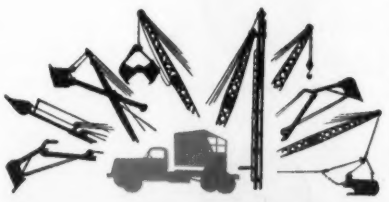
"QUICK-WAY" Truck Shovels are built to travel with any of your other mobile equipment — anywhere a truck can go, at truck speed. Quality steel is used throughout to cut dead weight and improve strength and durability.

"QUICK-WAYS" are built low for stability on the job and on the road, clear low underpasses.

All parts are simple and easy to get at; this holds servicing time and expense at the minimum. Many working parts are interchangeable for easier, cheaper maintenance.

Best of all, a *"QUICK-WAY"* is many machines in one. Attachments are removed and replaced IN MINUTES to convert your *"QUICK-WAY"* from SHOVEL to CRANE, DRAGLINE, CLAMSHELL, PILE DRIVER, TRENCH-HOE, BACKFILLER or SCOOP. For speed, portability, economy of operation, and adaptability to a wider range of jobs, nothing of comparable size equals a *"QUICK-WAY"* Truck Shovel. There's a *"QUICK-WAY"* owner near you; ask HIM.

* Reg. U. S. Pat. Off.



Model E: 4/10 cu. yd. cap., mounts on standard. 3-ton truck.

Model J: ¼ cu. yd. cap., mounts on standard 1½-ton truck.

"QUICK-WAY"
TRUCK SHOVEL CO.
DENVER, COLORADO

Tar-Mulch Pavement Reduces Road Costs

(*Continued from preceding page*)

and a Caterpillar D7 dozer shaped the gravel. This was followed by rolling with any of four Buffalo-Springfield 10-ton rollers—three 3-wheelers and one tandem. The work was done in two separate courses; the top course had a 2½-inch crown on the tangents.

In order to speed up the work and atone for lost time, the contractor at times worked three shifts around the clock. Two large-size G-E light plants were set up in the gravel pits to illuminate the loading, while four Kohler 1,500-kw light plants were scattered about on the road where the gravel was being placed. The machines were also well equipped with floodlights. Ordinarily, however, only one shift of 10 hours was worked during 1947.

Tar-Gravel Mulch

The gravel foundation course was completed by July 1, 1947, then the 2½-inch tar-gravel mulch was placed on top. Before the mat was laid, the base was first primed with an application of RT-5 tar at the rate of 0.2 gallon to the square yard. All the tar bitumen used on the job came from the Buffalo, N. Y., plant of Koppers, Inc. It was shipped by rail in tank cars over the Pennsylvania Railroad to sidings either at Quaker Bridge or Red House along the west boundary of the park. The average haul from these two sidings to the center of the project was 6 miles. Occasional shipments of tar were made over the road in trailer tank trucks from Buffalo 75 miles away.

Before the prime was shot, the top course of gravel was swept clean with a Hough power broom pulled by a truck. The temperature of the prime when applied was between 160 and 170 degrees F. It was shot with Koppers-owned distributors.

C. & E. M. Photo

Gravel is being spread over fat spots of bitumen on the completed seal coat which Warren Bros. placed on the Allegany State Park road in New York State. The Chevrolet truck has a Burch spreader box hooked to it.

Following the prime, trucks and Burch spreader boxes laid a windrow of graded gravel 2 to 3 feet from either edge of the new base on tangents, and on the high side of curves. The gravel had been screened over a 1¾-inch screen as it was loaded into the trucks from the two borrow pits. The depth of the windrow varied with the width of the pavement, but for a 20-foot width it was 10 feet wide and 6½ inches deep, loosely spread. From this windrow the graders spread the gravel to a width of 15 to 16 feet. Then it was given an initial shot of RT-5 tar at the rate of a little over 0.5 gallon to the square yard, the tar being applied from a 14-foot spray bar.

The Caterpillar No. 12 motor graders bladed the tar and gravel back and forth across the road until thoroughly mixed, then spread it into a windrow on one side of the road. When the contractor was ready to give the mulch a second shot of RT-5, it was spread out as it had been for the first application, and enough RT-5 was applied to give a total tar content of 1.1 gallons per square yard.

The graders again mixed the materials together as they pushed them back and forth across the road. The mat was finally laid out the full 20-foot width of pavement. The tar used in the mulch was applied at a temperature of 175 degrees F.

Then the mulch was corrected for any irregularities in the crown of the road by a Gledhill Road Adjuster, which was attached to one of the graders. This device has three blades, one perpendicular to the edge of the road and the

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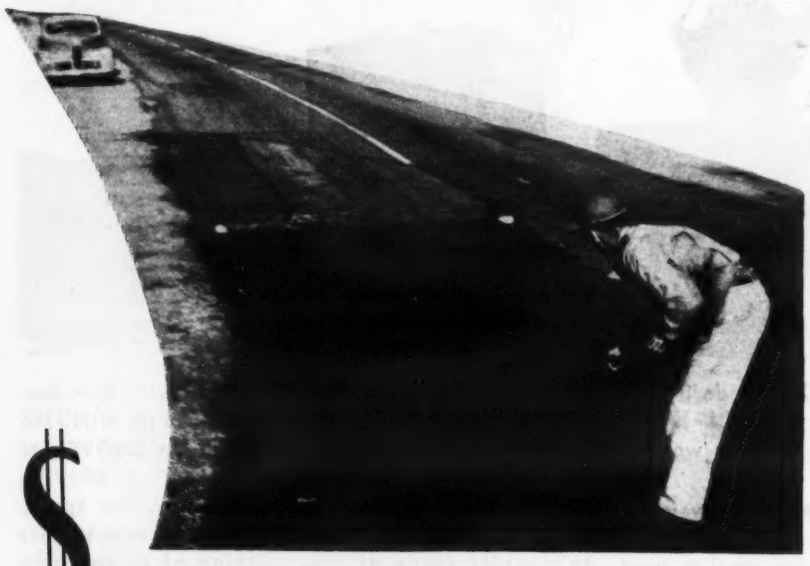

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Your First Drum of NOSTRIP is our Best Salesman

Now that the Fall and Winter patching season is here—try Nostrip this year! Experience will prove that Nostrip makes bituminous patches hold and last, even under the most adverse weather conditions.

Patch work may even be carried on during the rain, and it is not necessary to dry out chuckholes or to use dry aggregates for stock-pile or patching mix. Your first drum of Nostrip is our best salesman. Take advantage of this special offer. Try Nostrip on your next patching job.

The first drum only, to an entirely new customer, will be priced specially to you—$60.00 delivered anywhere in the United States—400 pounds net weight of Nostrip.

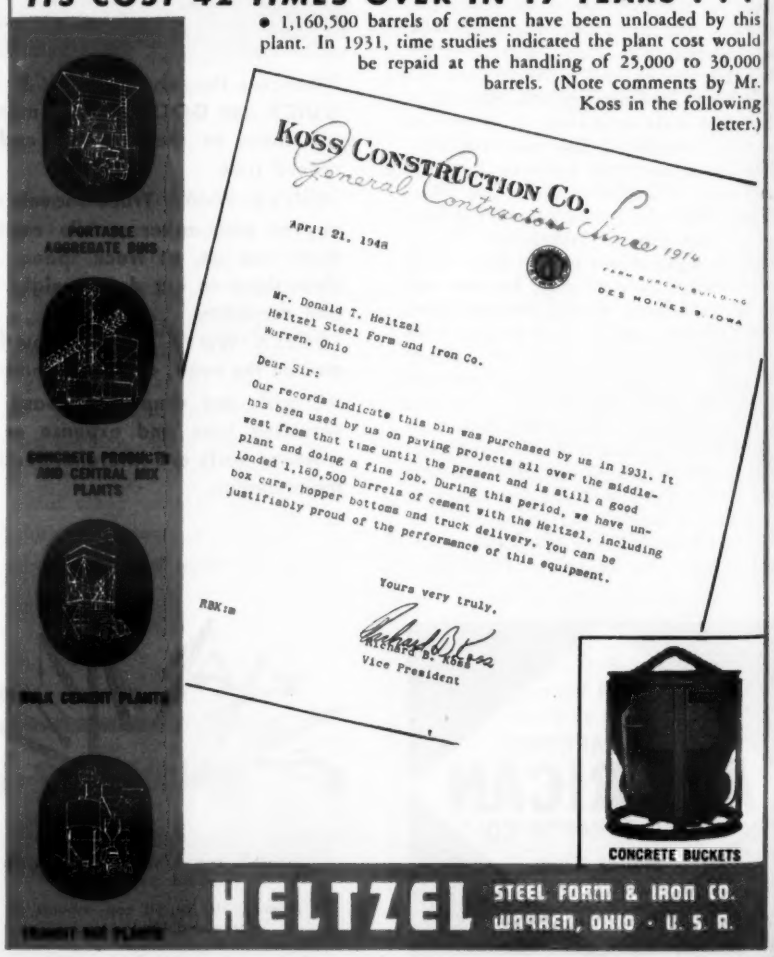
Order on your own letterhead or write us.

NOSTRIP DIVISION OF MAGUIRE INDUSTRIES, INC.

122 East 42nd St New York 17, N. Y.

VETERAN HELTZEL PLANT HAS REPAID ITS COST 42 TIMES OVER IN 17 YEARS . . .

● 1,160,500 barrels of cement have been unloaded by this plant. In 1931, time studies indicated the plant cost would be repaid at the handling of 25,000 to 30,000 barrels. (Note comments by Mr. Koss in the following letter.)


PORTABLE AGGREGATE BINS
CONCRETE PRODUCTS AND CENTRAL MIX PLANTS
BULK CEMENT PLANTS
TRANSIT MIX PLANTS
KOSS CONSTRUCTION CO.
General Contractors Since 1914
April 21, 1948
FARM BUREAU BUILDING
DES MOINES 8, IOWA
Mr. Donald T. Heltzel
Heltzel Steel Form and Iron Co.
Warren, Ohio
Dear Sir:
Our records indicate this bin was purchased by us in 1931. It has been used by us on paving projects all over the middle-west from that time until the present and is still a good plant and doing a fine job. During this period, we have unloaded 1,160,500 barrels of cement with the Heltzel, including box cars, hopper bottoms and truck delivery. You can be justifiably proud of the performance of this equipment.
Yours very truly,
RBK:m
Richard B. Koss
Vice President
CONCRETE BUCKETS

HELTZEL STEEL FORM & IRON CO. WARREN, OHIO · U. S. A.

others at 45-degree angles. Finally, the mulch was rolled by the 10-ton 3-wheel rollers.

The gradation of the gravel used in the mulch paving is as follows:

Sieve Size	Per Cent Passing
1⅜-inch	100
1-inch	50-85
¼-inch	35-55
No. 200	0-5

Seal Coat

The surface of the mulch was finished off with a seal coat consisting of an application of 0.3 gallon of RT-8 tar to the square yard. It was then covered with No. 1A gravel at the rate of 25 pounds to the square yard. The cover coat of aggregate was laid on with a Burch chip spreader which was hooked to the tail-gates of trucks carrying up to 5½ tons of material. The trucks backed over the bitumen, laying the aggregate out ahead of the wheels. The bitumen for the seal coat was applied at 200 degrees F. The gradation of the gravel was as follows:

Sieve Size	Per Cent Passing
½-inch	100
¼-inch	90-100
⅛-inch	0-15

The gravel was supplied by the Buffalo Slag Co. at Franklinville, N. Y., and was hauled to the job 25 miles in Fruehauf trailers hooked to Autocars. They carried 18 to 20 tons of aggregate, a load too heavy to pass over the park roads. Accordingly the gravel was transferred from the trailers to lighter trucks at the entrance to the park. Openings 16 inches square were cut in the tail-gates of the trailers which discharged from the top of a ramp dug into the side of one of the gravel pits. The gravel ran out this hole and down a chute into the lighter trucks on a lower level. As the trailers emptied out, their bodies were raised so that they would be completely cleaned. One trailer load would fill 3 or 4 smaller trucks quickly and without the use of a crane or a conveyor.

After the gravel was spread, it was rolled into the surface by the 3-wheel rollers which pulled fiber brooms along behind them in order to fill all the voids. If any fat spots of bitumen were detected in the road, more gravel was spread over them by a truck and spreader box rolling along on the lookout for just such locations.

Quantities and Personnel

The major items of the 19.6-mile road contract included the following:

Unclassified excavation	47,300 cu. yds.
Tar	385,400 gals.
Foundation course, run-of-bank gravel	101,000 cu. yds.
Top course, graded gravel	241,400 sq. yds.
Pipe, 12 to 36-inch	3,437 lin. ft.

Warren Bros. Roads Co. was represented on the project in its early stages by Francis J. Cunningham as Superintendent, with M. E. Morrow as his assistant. In 1947 Cunningham was moved to another job, and Morrow became Superintendent with L. M. Dennis as his assistant. An average force of 25 per shift was employed. For the New York State Department of Public Works, Howard P. Blue was Resident Engineer. The 5th District of the Department, with headquarters at Buffalo, is headed by Charles R. Waters, District Engineer. Charles H. Sells is Superintendent of Public Works.

History of Power Traced In Anniversary Catalog

The evolution of power through the ages and its present applications are the subject of the periodical "Production Road" issued by the Twin Disc Clutch Co. of Racine, Wis., to celebrate its 30th anniversary. The bulletin describes some of the more important steps in man's efforts to harness the forces of power. It tells of his discoveries leading to the application of steam power, of the development of the gasoline and diesel engines, of the generation and application of electricity, and other developments right up to the atom bomb.

The magazine then traces the development of much of the heavy-duty construction equipment in use today, with photographs of the old and the new. It also illustrates several power units which employ Twin Disc clutches for the transmission of power. The periodical lists four heavy-duty clutches, a light-duty-tractor clutch, power take-offs, reduction gears, marine gears, air-actuated clutches, hydraulic couplings, hydraulic power take-offs, and hydraulic converters.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 112.

Anti-Freeze Solution

A new anti-freeze solution is announced by the Speco Solvents Division of Speco, Inc., 7308 Associates Ave., Cleveland, Ohio. It is described as a blend of super-refined alcohols, specifically formulated to meet the requirements of modern automotive cooling systems. Chemical additives are said to prevent rust and corrosion of metals in the cooling system, and damage to rubber hose.

The manufacturer states that Freezex has a higher boiling point than is encountered in normal engine operation, and that it will not leak out of any cooling system tight enough to hold water. It is currently available in 54-gallon drums for immediate delivery.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 81.

Air Curtain Guide Plates

For Perfect Traffic Lines:

AIR CURTAINS, basic feature of all Kelly-Creswell Equipment, make possible the application of clean-cut, attractive lines *without* coming in contact with the surface.

Special striping guns by DeVilbiss, air-actuated traction and pressure-cleaning equipment also feature K-C equipment. These are the reasons why more Highway Zone-marking material is applied through K-C equipment than through any other make.

TRUCK-MOUNTED AND PORTABLE EQUIPMENT AVAILABLE

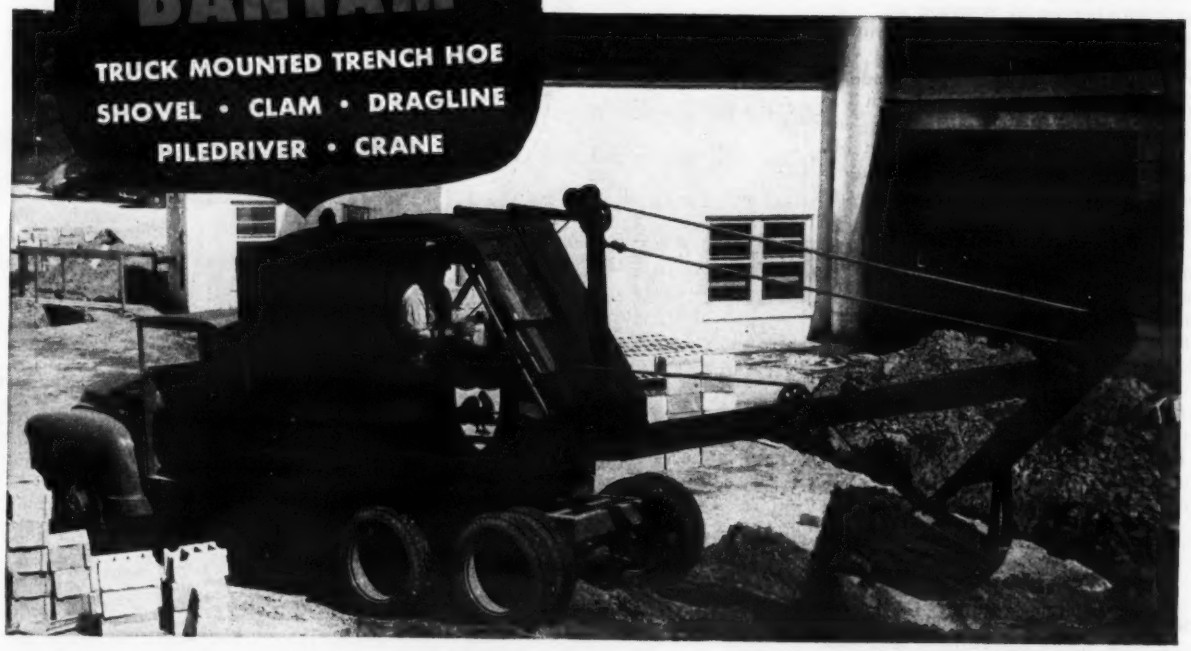
There is a Kelly-Creswell Model that will solve your zone-marking problems.

KELLY-CRESWELL CO., Xenia, Ohio

the LITTLE MACHINE that gets BIG results!

THE 1/3 YARD SCHIELD BANTAM

TRUCK MOUNTED TRENCH HOE
SHOVEL • CLAM • DRAGLINE
PILEDRIVER • CRANE



NORMAL CAPACITY PER HOUR

- **Shovel or Dragline—60 yards**
- **Trench Hoe—100 feet of 5 ft. ditch**

Drive up and dig in. The Schield BANTAM goes into tight spots and gets the job done fast and economically. Its *full circle design* and smooth, *fast cycle operation* pile up profit-making yardage.

Big machine design with *no strain* on center pin, high strength alloy construction throughout. All major assemblies roll on ball bearings for easier handling, longer service life, lower maintenance costs.

Easily changed booms and buckets make the Schield BANTAM 6 machines in one, ready on short notice to speed across town or across country. Mounts on any 1½ ton truck chassis.

For performance that spells profits in excavation and backfill, drainage work, basement digging, handling construction materials, etc., put a Schield BANTAM on the job.

Write for complete details now

THE SCHIELD BANTAM CO., INC.
200 Park Street **Waverly, Iowa**

SOLD AND SERVICED BY LEADING CONSTRUCTION MACHINERY DEALERS THROUGHOUT THE UNITED STATES, CANADA, AND FOREIGN COUNTRIES

Fast on the job and fast on the road. The BANTAM Trench Hoe all set to travel.

The BANTAM Shovel is ideal for economical handling of stockpile materials.

Dragline with box boom. The BANTAM is convertible in a matter of minutes.

This metal joint for rustication work on architectural-concrete structures is available for purchase or rental from Williams Form Engineering Corp.

Rustication Joints

Metal rustication joints for "dressing-up" architectural-concrete structures have been developed by the Williams Form Engineering Corp., P. O. Box 925, Madison Square Station, Grand Rapids 7, Mich. These metal interlocking sections can be re-used, they save time in placing, and they are plated to prevent corrosion, the manufacturer points out. The use of a sticky type of oil speeds the removal of these rustication joints and reduces the danger of breaking corners.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 47.

Sprockets and Gears

A complete line of sprockets and gears is manufactured by the Cogmatic Co., 757 N. Water St., Milwaukee 2, Wis. The sprockets come in sizes and types to fit almost all classes and pitches of chains. Feature of the Cogmatic line is the use of a flame-machining process for precision cutting and automatic toughening of wearing surfaces. The flame machining is said to provide accuracies of up to 0.003 inch.

The Cogmatic sprockets are made in sizes up to a 6-inch pitch, and with 3 to 64-inch outside diameters. They can be provided with any number of teeth between 7 and 50; with even numbers between 50 and 100; and from 100 to 200, with numbers divisible by 4. A ¾-inch center hole is standard for sprockets up to 12 inches in diameter, and a 1½-inch hole for 12 inches and larger. The gears are made with a diametrical pitch of 1 to 4; an outside diameter of 3 to 64; and with the same teeth-numbering specifications as the sprockets. With gears more than 3 inches wide, the teeth are laminated.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 86.

Handbook on Wire Rope

A pocket-size handbook containing 130 pages of information on wire rope, wire-rope slings and fittings, and other steel products is available from Bethlehem Steel Co. of Bethlehem, Pa. It discusses grades of wire rope, Telfax tape, the types of rope construction, cross-sections of common constructions, lubrication, types of lays, types of cores, zinc-coated Bethanized wire rope, etc.

Catalog No. 165 tabulates the various ropes in the line, covering diameters, price per foot, approximate circumference and weight, breaking strength, and telegraph-code names. Specialized products listed in the catalog include highway guardrails, guard cable, guard-rail brackets and fittings, anchor rods, cable ends, cable splicers, bridge cables, Crosby clips, sockets, hooks, turn-buckles, thimbles, etc. The booklet also contains information on the proper handling and care of these items.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 43.

Represents Haiss in Conn.

S. DeVries has been appointed an exclusive sales representative by the George Haiss Mfg. Co., Inc., of New York City. He is agent for the complete Haiss line of material-handling equipment in the state of Connecticut. His address is P. O. Box 31, Milldale, Conn.

ASCE Holds Fall Meeting

Traffic and city-planning problems, construction-costs control, power, air transport, sanitary engineering, and other subjects affecting the northeastern section of the United States were discussed at the autumn meeting of the American Society of Civil Engineers held in Boston last month. Hosts to the national convention were the Society's Northeastern Section and the Boston Society of Civil Engineers. The Boston Society—celebrating its centennial this year—is the oldest engineering organization in the country. Professor Albert Haertlein of Harvard University's Civil Engineering Department cooperated with the Boston engineers on arrangements for the national meeting.

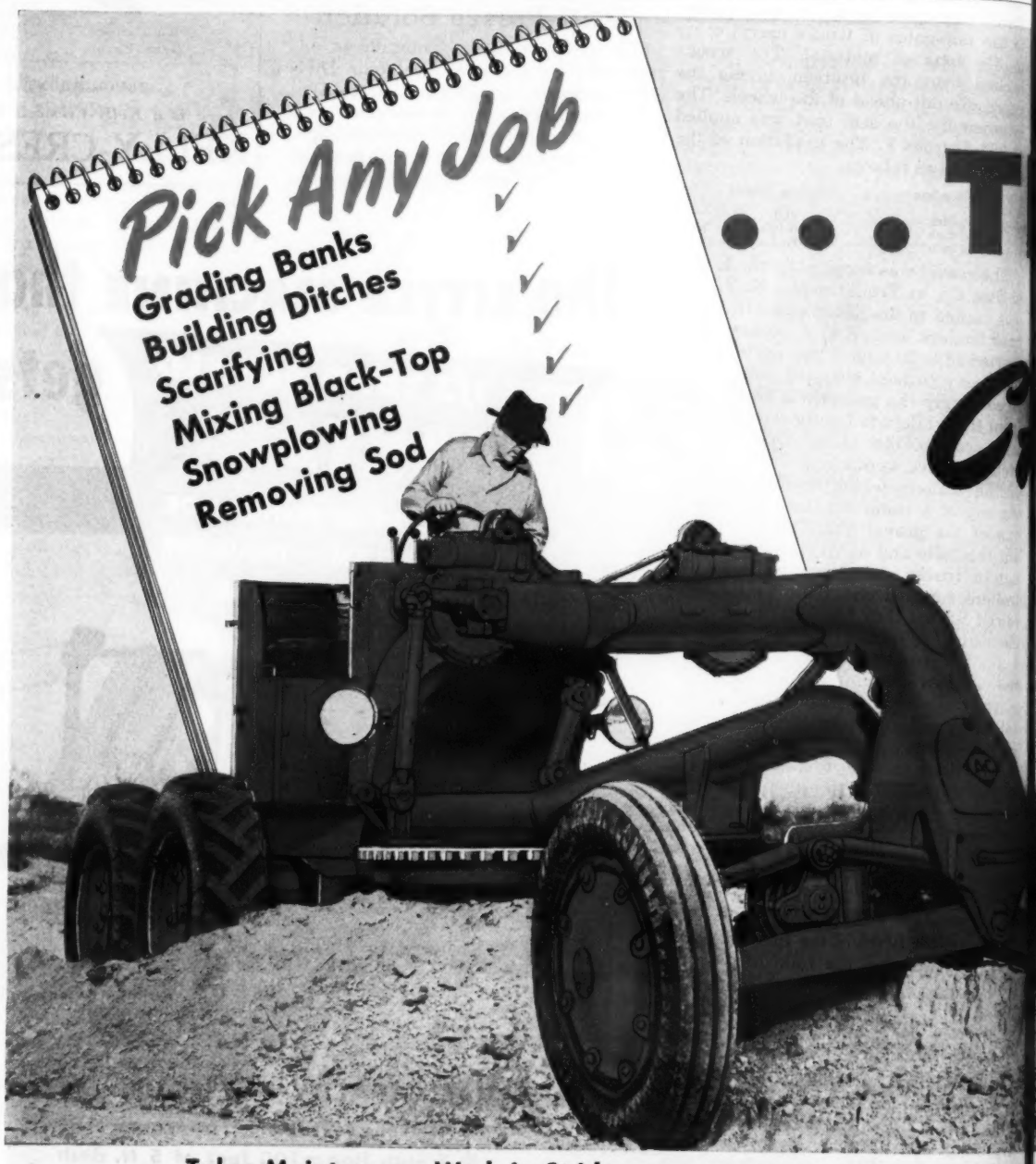
Nine technical meetings were held during the convention, in addition to general sessions, social functions, excursions of historic interest, Board meetings, and a conference for civil-engineering students of New England colleges and universities.

Automobile Facts, Figures

The 28th edition of "Automobile Facts and Figures" has been released by the Automobile Manufacturers Association, New Center Bldg., Detroit 2, Mich. It presents detailed information on all phases of automobile production, uses, taxes, and so forth. The information is compiled in tabulated form, with accompanying charts, graphs, and diagrams to make the tabular data more vivid.

"Automobile Facts and Figures" lists registration of vehicles by states and countries, shows trends over the years, and presents data on the age of vehicles in use. It covers labor and wage activities in the automotive industry, automotive taxes, and highway construction and maintenance expenditures.

Copies of this booklet may be obtained free from the Association.



Takes Maintenance Work in Stride — cuts smoothly, to fractional inch accura… held firmly on work through direct down pressure. Highly maneuverable — ideal for … close going and on narrow roads and streets.

Easily Grades Banks — tears into heavy bank work . . . hugs slopes as it smooths — it is strong, stable, powerful, properly balanced.

Builds Ditches Quickly — leaning front wheels are set firmly against load . . . extra stability and flotation obtained with oversize front tires. No protruding hub caps to break off or hang up grader.

Scarifies, …ack-top — you'll be s… the pow… er and stabil… 0 on thi… work . . . tear… materia… turns over he… ows.

Flame-Thrower Catalog

A flame thrower which uses kerosene or other low-volatile fuel is described in a release prepared by Cedarberg Mfg. Co., Inc., 527 S. 4th St., Minneapolis 15, Minn. The unit is recommended by the company for thawing out frozen pipes, trucks and tractors, and other general thawing purposes—as well as for burning weeds.

The folder lists the specifications for the Cedarberg flame thrower, covering dimensions and weight, fuel capacity, length of run on one gallon of fuel, and the heat the unit will produce. It also describes the safety devices incorporated in this self-contained portable machine.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 30.

Larsen, FWD Engineer, Dies

Herman Larsen, Experimental Engineer for The Four Wheel Drive Auto Co., died recently in Colorado Springs, Colo. Mr. Larsen was one of the oldest employees in point of service, having been with the company for over 28 years. He was a member of the Committee on Winter Driving Hazards of the National Safety Council.

Power-Tool Line Listed

A 22-page catalog listing the firm's complete line of portable power tools has been prepared by Syntron Co., 227 Lexington, Homer City, Pa. The catalog devotes 10 pages to a description of the Syntron electric hammer; 4 pages to the self-contained gasoline-hammer paving breakers; 2 pages to concrete-form vibrators; 2 pages to flexible-shaft concrete vibrators; 2 pages to electric drills; a page to the Syntron electric screw drivers; and a page to the grinders and sanders.

Catalog 486 tells about the construction of each unit, the way it operates, its rated speed, its size, etc. The basic units are described in detail, as are the various accessories and tools designed to increase their usefulness.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 77.

Disston Ups Gillespie

William P. Gillespie is Manager of a new Market Requirements Department established by Henry Disston & Sons, Inc., manufacturer of saws, tools, and special alloy steels. He was formerly Assistant Manager of Sales in the Hardware Division.

TE NEW BD
CN HANDLE 'EM ALL

The BD brings you big grader performance at medium grader economy! A 17,772 lb. machine with a 50.5 brake hp. diesel engine, it does a remarkable job on every job — pushes more dirt than you would ever believe possible. Easily handles high, heavy bank cuts or tough ditch work . . . it's a *motor grader* — through and through!

There's no *one* reason for its unusual earth-moving capacity and versatility . . . it's a combination of *all* features —

. . . the ***right balance*** **between weight, speed and horsepower for greater stability, more traction and fast, accurate cutting.**

. . . **a "*roll-away*" *moldboard* that rolls instead of pushes material, requiring less power.**

. . . ***high clearance*** **at throat as well as axle that increases volume of material handled.**

. . . **tandem drive, direct down pressure of blade, full circle revolving blade, a full range of blade positions**

. . . **General Motors 2-Cycle Diesel Power, leaning front wheels, easier steering and convenient controls, full blade visibility — these and many other advantages all contribute to its outstanding performance.**

Whatever the type of job . . . the BD Motor Grader can do it . . . at big savings to you. "Seeing Is Believing." Watch it perform at your first opportunity.

FULLY EQUIPPED, including electric starter and lights. Available with scarifier, cab and snowplow. Choice of standard or oversize front tires (9:00 or 12:00).

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

Hazards to Workers On Bridges, Buildings

Dizziness, Defective Equipment, and Carelessness Are Greatest Dangers To Workers on Scaffolds

By Dr. W. Schweisheimer

✦ THERE is something about a scaffold at dizzy heights, swaying in a stiff breeze, that does things to a man's nerves. Only a few can qualify for the work. For example, only 400 out of 700 who applied for painting jobs on the George Washington Bridge in New York passed the medical and psychological tests; and the applicants included steeplejacks, former seamen, parachute jumpers, and Air Force fliers. Moreover, only 30 of the 400 could scramble about the framework with enough nonchalance to qualify.

No George Washington Bridge painters have been killed, but there have been narrow escapes. And firm safety measures have had to be adopted, including nets and belts wherever possible, constant observation by foremen, and a ban on smoking to keep lead poisoning from entering the painter's body through his lips. A new painter is accompanied by two old hands who observe his reactions and bring him down if he gets in trouble. If he "freezes" on a high ladder, they fasten a rope or put their arms around him to steady his nerves.

Dizziness—Eyesight

Whether men are working on high bridges or on high buildings, dizzy spells, even slight attacks, are common accident provokers. Frequently these spells are caused by severe physical or mental strain, over-long hours of work, or insufficient sleep. Still other causes are too much smoking or excesses in general, the aftermath of an illness such as the grippe, anemia, constipation, etc. Nervous dizziness also attacks workers "in high places", though it disappears quickly under proper treatment and care. But as long as he is troubled by dizzy spells, no workman should be alone on a ladder or scaffold.

Sometimes men working at dizzy heights are nearsighted or farsighted. Perhaps they find themselves without their glasses to which they are accustomed and on which they depend. Or perhaps they need two pairs of glasses —one for distance and another for close range—and they avoid the slight trouble of changing glasses.

As a result, their vision blurs. They estimate incorrectly the distances they have to cope with on their scaffold. And another accident is in the making.

Ladders and Scaffolds

Some time ago in New York the causes of accidents to painters were examined. It turned out that ladders and scaffolds together caused 51.3 per cent of these accidents. In the building trades in general, comparative statistics show that accidents caused by ladders and scaffolds are about two and one-half times as frequent as in all other occupations. Defective equipment or over-hasty, careless handling of the equipment caused the disastrous falls.

Defective ropes are often to blame. Sometimes the hooks that supported the scaffold are insecurely fastened to the roof and give way. Often there are not available accessory safe planks and adequate ladders.

Were the scaffolds built to take the maximum material load which may be placed on them—as well as the weight of the workers—, were the ropes and horses and ladders checked for deterioration, accidents costly to workers and employers might be avoided.

But haste and careless use of equipment must also take their share of the blame for scaffold and ladder accidents. Many accidents occur when workmen overreach. They may fall, or they may strain themselves by working in abnormal positions. And all because ladders are placed too far away from the point to be reached, or too close to it; or because the ladder used is too short for the job; or simply because the worker overreaches to save moving the ladder or scaffold.

It is odd—or perhaps not so odd, after all— that there is far more negligence of this sort on low buildings than on skyscrapers. Apparently even the hasty worker takes time to realize that while a fall from a three-story building *may* be lucky, and *may* net only a sprained ankle, a slight stumble on a skyscraper is fatal.

Men who are called on to work on exposed scaffolds and ladders are in a risky business at best. But a high percentage of the occurring accidents might be avoided by greater attention to the safety of equipment, and to the health, supervision, and training of the worker.

Tractor-Mounted Loader

A 4-page folder on the Shoveloader is available from the Lull Mfg. Co., 3612 E. 44th St., Minneapolis, Minn. It stresses the versatility of the unit, pointing out that it can be used with a bulldozer attachment, combination snow or coal buckets, concrete bucket, log-lifting forks, or with a crane attachment. According to the manufacturer, the Shoveloader can be used for all digging, loading, lifting, carrying, scraping, or bulldozing operations within its capacity range.

Bulletin AD-16 lists specifications for three Shoveloader models—the 4-A with a 2,500-pound lifting capacity; the 4-B with a 4,000-pound capacity; and the 4-C with a 6,000-pound capacity. The specifications cover lifting height, dumping height, speed of lift, forward reach, shipping weight, and specifications of the various attachments.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 103.

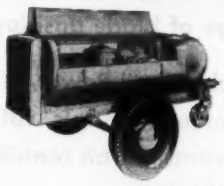
Before repainting the hydroelectric dam at Reusens, Va., Miller Contracting Co. of Ohio removed old paint from steel surfaces by the Airco oxyacetylene flame cleaning process. The intense heat of the flame cockled the old paint, loosened rust, and removed surface moisture from the steel. All of this was done in one operation.

Here's Portable AIR POWER at Lowest Cost and Topmost Efficiency

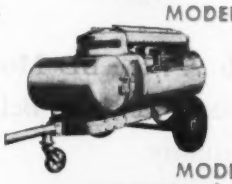
Model 105, delivering 105 CFM at standard pressure. Joy pioneered the compact modern "package-type" portable compressors, and now builds the seven sizes shown below... with a variety of mountings—2-wheel, 4-wheel, skid, or adapted for truck mounting.

JOY SERIES 80 PORTABLE COMPRESSORS

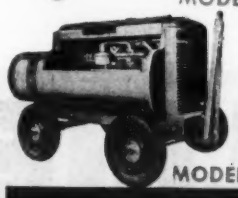
Compare these Features!



MODEL 60



MODEL 160



MODEL 210

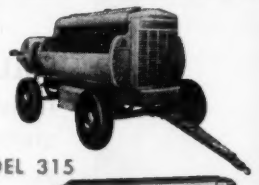
★ 2 STAGE COMPRESSION

★ AUTOMATIC "ECONO-MISER" LOAD CONTROL

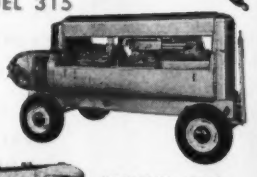
★ SEVEN SIZES—60 TO 630 CFM

★ NOTHING TO MATCH THEM FOR MODERN, COMPACT DESIGN—PORTABILITY—RELIABLE AND EFFICIENT OPERATION

WRITE FOR BULLETINS!



MODEL 315



MODEL 500

MODEL 630

W&D C-2074

Consult a Joy Engineer

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY-SULLIVAN OF CANADA, LIMITED, GALT, ONTARIO

The Allis-Chalmers tubular-frame design marks the new AD-4 motor grader, built for heavy-duty work. It is powered by a General Motors Series 71 diesel engine with a brake hp of 104.

Heavy-Duty Grader Has a Tubular Frame

A new AD-4 motor grader designed for heavy-duty construction and maintenance work is announced by the Allis-Chalmers Mfg. Co., Tractor Division, Milwaukee, Wis. It is powered by a General Motors 2-cycle Series 71 diesel engine with a brake horsepower of 104. The AD-4 features the use of tubular-frame design.

The 144-inch blade has a side-shift range of 40⅝ inches right or left from the center position, an 18-inch shift on the moldboard arms, a 17½-inch lift above the ground, a 90-degree bank-cutting angle, a reach of 70 7/16 inches outside the front wheels, and 7 pitch positions. Blade pressure is rated at 10,000 pounds without the scarifier or 12,000 pounds with it. Mechanically controlled front-mounted lift cases provide direct down pressure of the blade and allow adjustments to fractions of an inch, the company points out. The AD-4 has six forward speeds ranging from 2.4 to 16.6 mph, and three reverse speeds ranging from 2.8 to 6.2 mph. It has a 30-inch throat clearance and a weight of 22,140 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 29.

Steels for Special Uses

Three new bulletins are available from Joseph T. Ryerson & Son, Inc., Box 8000-A, Chicago 80, Ill. One deals with Ry-Ax, described as a heat-treated carbon-manganese hot-rolled bar steel; another with Ryerson's abrasion-resisting steel plates and sheets; and the third with Rytense AA, described as a medium carbon-manganese free-cutting machinery steel for production of machined parts.

The bulletin on Ry-Ax gives mechanical properties, hardness readings, and machinability ratings. It also lists typical shafting, axle, and other uses for this steel. The bulletin on abrasion-resisting steel plates and sheets lists typical applications, performance records, and other general information, and describes heat treatment and fabrication. The bulletin on Rytense AA contains figures showing strength, machinability rating, typical analysis, mechanical properties, and hardness at various tempering temperatures. It lists the shapes in which the material is offered and some recommended applications.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. For the bulletin on Ry-Ax, circle No. 73; for the one on abrasion-resistant steel sheets and plates, circle No. 74; and for the bulletin on Rytense AA, circle No. 75.

Diesel Power Unit

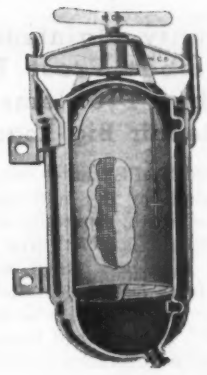
A new diesel power unit is announced by The Buda Co. of Harvey, Ill. A 4-cycle 8-cylinder overhead-valve vertical engine, it is rated at 280 hp at 900 rpm, 370 hp at 1,100 rpm, and 440 hp at 1,200 rpm. Standard equipment includes an oil-bath air cleaner, a Buda 50-hp gasoline starting engine, belt-driven supercharger, etc. An electric motor or air-starting unit can be supplied by Buda.

The 8-DCS-2505 engine has a 6¾-inch bore, 8¾-inch stroke, and a piston displacement of 2,505 cubic inches. It is 163¼ inches in overall length from radiator to clutch, 62¾ inches wide at the radiator, and 91 inches high. It weighs approximately 13,240 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 33

Get All the Lubrication Good Oil Provides!

WGB Clarofication Assures Lower Lubrication Costs—Longer Engine Life



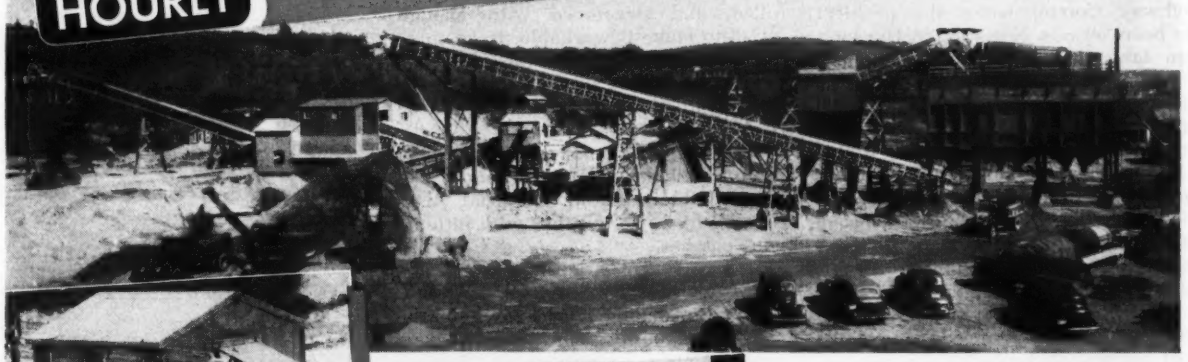
AND HERE'S WHY: Intensive laboratory tests prove that correctly processed, properly formed and adequately supported, fine cotton is the most efficient filtering medium for all kinds of oil. Further, WGB Clarofication thoroughly cleans the oil—without removing essential additives or other lubricating qualities. The WGB Cartridge outlasts other types by a ratio of 2 to 3 . . . cuts engine repairs to a new unheard-of low—and can be changed without tools! Get to know the advantages of WGB Clarofication.

W. G. B. Oil Clarifier, Inc. 139 Cornell St. Kingston, N. Y.

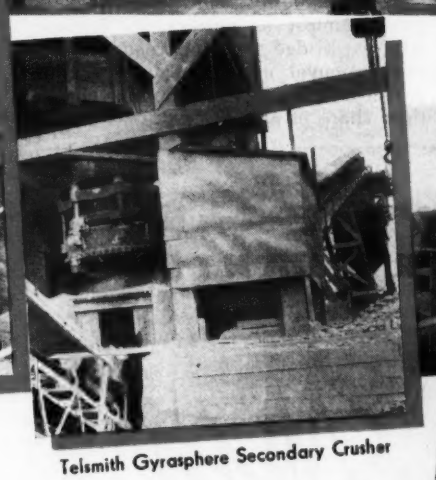
FLEXIBLE TELSMITH PLANT MAKES

200 TONS HOURLY

5 Sizes, WASHED GRAVEL
3 Sizes, CRUSHED GRAVEL
2 Sizes, SAND



Telsmith Two-Deck Pulsator
Telsmith Jaw Crushers



Telsmith Gyrasphere Secondary Crusher

Telsmith Hercules Washing Screen

● The MANCHESTER SAND, GRAVEL & CEMENT CO. plant at Manchester, New Hampshire, is turning out 200 tons of aggregate an hour—to supply federal, state, city and private jobs. Deliveries are made by trucks and railway cars.

This flexible Telsmith-equipped plant is making 5 sizes of washed gravel: 3½"-1½" (100% crushed), 1½"-1", 1"-¼", ¾"-¼", ⅜"-¼" —3 sizes of crushed gravel: ¾"-½", ½"-¼" minus ¼"—2 sizes of sand: minus ¼" concrete sand, and mason sand. It can also make bank-run sand and gravel with oversize crushed.

Mr. P. H. ("Pete") Rice, president of the company says, "*We have been completely satisfied with every piece of Telsmith equipment that we have had and the service has been excellent.*" Telsmith capacity, flexibility, product quality and economy will satisfy *you*. Get Bulletin G-34.

TELSMITH Equipment in This Plant

24" x 5' Plate Feeder
4' x 8' 2-Deck Pulsator
10" x 30" Roller Bearing Jaw Crusher
10" x 36" Roller Bearing Jaw Crusher
4' x 10' 3-Deck Pulsator
36" Telsmith Gyrasphere Secondary Crusher
60" x 22' long Hercules Washing Screen
2' x 6' 1-Deck Pulsator
Two—28" x 12' Single Screw Rewashers
No. 6 Sand Tank
3' x 10' 3-Deck Pulsator

G-16

SMITH ENGINEERING WORKS, 4014 N. HOLTON STREET, MILWAUKEE 12, WISCONSIN

Cable Address: Sengworks, Milwaukee

51 East 42nd St. New York 17, N. Y. · 211 W. Wacker Drive Chicago 6, Ill. · 713 Commercial Trust Bldg. Philadelphia 2, Pa. · 238 Main Street Cambridge 42, Mass. · Boehck Eqpt. Co. Milwaukee 3, Wis. · Mines Eng. & Eqpt. Co. San Francisco 4, Calif.

Clyde Equipment Co., Portland 9, Ore., & Seattle 4, Wash. • General Machinery Co., Spokane 1, Wash. • Brandeis Machinery & Supply Co., Louisville 8, Ky. • Rish Equipment Co., Charleston 22, & Clarksburg, W. Va.—Roanoke 7, & Richmond 10, Va. • Wilson-Weesner-Wilkinson Co., Knoxville 8, & Nashville 6, Tenn.

ATLAS CONCRETE FORMS

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Irvington, 55 N.Y.

Frost Heaves Plague Northern Road Crews

County Maintenance Men Combat Frost Boils and Other Problems as They Repair Big Road System

✦ PERHAPS the worst road-building problem in the cold-weather country of the north, especially where clay soils are found, is frost heave. For years, the best highways failed in spring when the frost left the ground. In due time the failures came to be known as "frost boils", so described because of the peculiar soft, mushy nature of the eruption.

Douglas County, Wis., situated in the northern part of the state on the shores of Lake Superior, has solved the frost-heave problem only by attacking the thing at its source, by thinking in terms of cause rather than effect—by using insulating sand blankets.

In Douglas County the temperature in winter drops down far below the zero mark, and stays that way for weeks. The frost penetrates the ground to a depth of 5 or 6 feet. If the soil is predominantly sandy loam and silt, frost heaving in the spring is a foregone conclusion. Moreover, if the autumn months have been wet so that the ground is saturated, frost heaving will be worse than if the fall months were dry.

For Conrad Hanson, Douglas County Highway Commissioner, the problem has been serious. Not only do Hanson's men take care of a 330-mile county trunk system, but they also have the maintenance responsibility of some 130 miles of first-line state and Federal trunk routes in the county.

In the old days, ten or fifteen years ago, highway men in Douglas County tried to cure frost boils by thawing an outlet hole with a steam pipe down to unfrozen ground. The theory of this solution was sound, but unfortunately it failed to work out successfully in practice. Then they tried to dig the frost heaves out, replacing the material with crushed rock or gravel. This, although a fairly satisfactory solution, was like operating on a patient already half dead.

Finally the County decided to combat the thing at the source, and lay pavements only on materials not subject to the heaving action of frost. Heavy insulating blankets of sand, crushed rock, or other pervious material are now placed full width and 12 inches thick or more under all new construction. For the past ten years this practice has been followed, with a minor refinement added occasionally here and there.

While frost expansion undoubtedly occurs in the unstable subsoil underneath the insulating blanket, its effects are not so pronounced. Where huge gaping holes formerly appeared in highways, perhaps now a small longitudinal or transverse crack is the only indication.

Extensive maintenance repair jobs were also started in the county about six years ago, and have been carried right up to this writing. Badly damaged pavements, over frost-heave soil, are being rehabilitated and they give good service after the job is done. If the old road has a bituminous mat, this material is scarified, pulverized, and stockpiled for later use. The worst soft places are dug out of the roadbed, and the material wasted.

A sand blanket then goes in—seldom less than 15 inches thick on the first-line highways. The bituminous material is then brought in on top of the sand mat, after the sand has been placed and rolled, and sweetened with enough MC-3 to make it workable. Road-mixing with motor graders then builds a temporary surface suitable for carrying traffic until the permanent mat can be road-mixed and laid down.

Where frost damage is relatively spotty, the holes are dug out and backfilled with insulating material, then covered in warm weather with bituminous patches.

Other Problems Solved

As serious as the frost-heaving problem is, the county highway crews have others almost as perplexing. Surface failures, bridge upkeep, weed control, snow removal, and the maintenance of gravel roads come up regularly for their share of attention.

C. & E. M. Photo

All road-maintenance equipment in Douglas County, Wis., is repaired regularly in this shop in Superior, the county seat.

Of the 130-mile state and Federal trunk system, about 70 miles are concrete and 60 miles are gravel or bituminous construction. In the 330-mile county highway system are 100 miles of road-mixed bituminous mats, 100 miles of gravel, and about 130 miles of graded, drained earth roads.

Concrete highways in Douglas County show the same kinds of failure that are typical over the United States, with failures perhaps accelerated where the concrete was laid on an insulating blan-

(*Continued on next page*)

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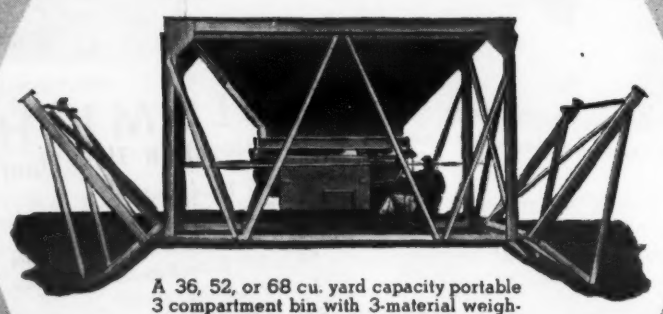

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ket that was too thin. Crack patterns develop, joints pump, the subgrade weakens, and the highways deteriorate. Many of these roads were built about 1921-1930, and they are now ready for extensive improvement.

The major improvement work by maintenance forces consists of resurfacing the older concrete with a road-mixed bituminous upper deck, and in some cases the application of hot-mixed asphaltic concrete. Ordinarily a mat 2½ inches thick is laid on work of this kind.

Very little support work with cement slurries has been done, and no asphalt undersealing at all has been attempted. What little Mud-Jacking has been done was handled by equipment and forces from near-by Ashland County.

Bituminous road failures have already been detailed, with the methods which remedy them. In general, however, MC-3 asphalt is used on road-mixed mats, at rates varying from 4 to 6 per cent, depending on the type of mineral filler. The trend is towards a leaner mix wherever possible, to increase cohesion and to improve stability. Most of the asphalt is shipped in by rail from refineries in the eastern Wyoming oilfields.

Some interesting work has recently been done in the southern part of the county, where sand is found. Roads there have been improved to the all-weather stage by mixing MC-3 asphalt in place with the native material. Some excellent results have been obtained, particularly in sections where the native sand is well graded from No. 200 to ¼-inch.

Maintenance of gravel and earth roads consists primarily of motor-grader work. The side ditches are cleaned when necessary, and the riding surface is shaped and crowned after rains. In late autumn, the entire right-of-way is cleaned and graded to aid snow-removal equipment. Because of the peculiar adhesive qualities of upper Wisconsin's red clay binder, very little gravel works loose in a gravel road, even during summer weather.

Auxiliary Maintenance

Snow removal is a job that can be expected any time from November 1 to April 15 each year. The snowfall in Douglas County, peculiarly enough, is not as great as it is in counties to the south and east. In fact, the county crews do not use a single piece of rotary equipment.

Motor graders with snow plows do the major share of snow-removal work, with two big FWD trucks equipped with V-plows and wings available for breaking drifts. The snowfall is generally light and powdery, accompanied by very low temperatures. During the snow season, equipment is well scattered throughout the county to do emergency and routine snow work.

"Our people up here demand winter roads about as clean as summer roads", Hanson explains with a wry smile.

Douglas County snow equipment operates almost as soon as snow begins to fall. Not many years back, maintenance men never attempted to remove 2 or 3 inches of snow, because the automobiles could make their way through. Now, however, plowing commences long before 3 inches have fallen. As soon as the ground is white, the machines go to work.

Weed control is not as universal as snow removal, because of the shortage of funds and equipment. It is limited to regular mowing along the Federal and state trunk highways, with occasional mowings on the county system. Every autumn the county highways, of course, receive a clean-up ahead of the winter snows.

One of the bad headaches in Douglas County is the matter of bridge upkeep. Timber is hard to get, while structural-steel members are almost impossible to get. With many lakes, streams, and rivers in the county, the bridge upkeep job would be big even if all conditions were favorable. As the situation now stands, bridge upkeep is done between seasons. While much painting has been done, there is a lot more left undone.

"It's a shame to see the unpainted ones," the Commissioner said, "but they represent a tough choice of what work must be left undone."

Equipment Upkeep

As equipment goes, the County has a small number of units but operates them at high efficiency. The major units consist of 12 motor graders, 8 trucks of from 3 to 7-ton capacity, 2 FWD snow trucks, and a bituminous line composed of asphalt heating kettles, tank-car heaters, asphalt distributors, and small allied equipment.

This equipment is moved about, from time to time, depending on where concentrations of work appear. Some of it may be assigned for months to one maintenance foreman, or it may move

(*Concluded on next page*)

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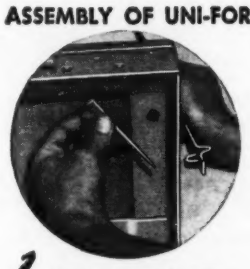

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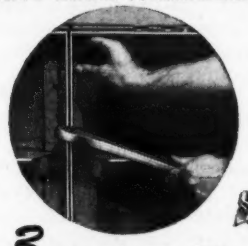
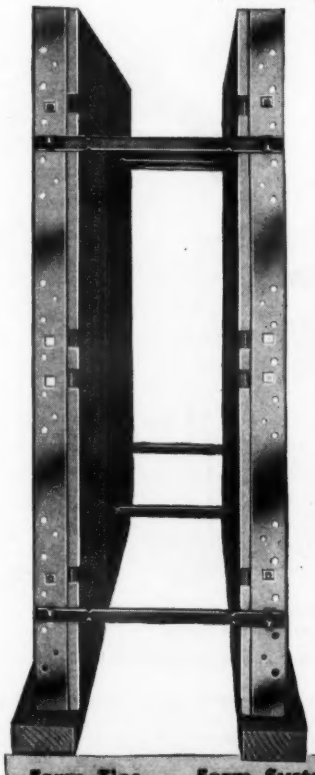


3 Bring the next UNI-FORM into position. Drop the second Tie Key into the Loop.



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(Continued from preceding page)

from job to job in gang maintenance work.

Minor repairs are always made in the field. Major overhaul work and the replacement of heavy parts is done in the central repair shop located near the courthouse in the heart of Superior, which is the county seat of Douglas County.

The main repair shop is a brick building 40 x 60 feet in size, and must be operated at utmost efficiency to be big enough for the repair jobs it has to do. This building is a combined repair shop, storage garage for equipment, and a fuel dispensary for county vehicles of all other departments besides the Highway Department.

Equipment repair usually consists of the replacement of factory-approved parts, but on occasion quite a bit of lathe work is also done. When axles wear down, they are frequently built up by welding, and the threads re-cut on the shop lathe.

In accordance with the principle that highway money must go first of all on the roads, the shop equipment is limited to the bare essentials to make necessary repairs. Long workbenches are available in all parts of the shop along the walls. Repair equipment consists of a Manley hydraulic press, a Black & Decker valve refacer, a 3-ton hoist, a 24-inch lathe, a Barnes post drill, a heavy-duty grinder, oxyacetylene and electric welding equipment, and an assortment of small and heavy-duty mechanic's tools.

County Organization

In Douglas County the maintenance forces comprise 45 regular employees, with such extra men as the work demands. Heading this crew is County Highway Commissioner Hanson, who is in charge of the work.

He is responsible in turn to the 5-man County Highway Committee, a group of men appointed by the elected County Board. At the present time the County Highway Committee is composed of Chairman Ernest Lindgren and Members John Theien, Harry Lundeen, Alva Arnold, and Ernest Nelson.

Under Hanson are a head maintenance foreman, three bituminous foremen, and a construction foreman. Each of these men has his own crew, equipment, and materials. Operations are centralized out of the Superior office to obtain the best efficiency, and details of county-wide work are ironed out in the frequent meetings of the County Highway Committee.

County highway maintenance is paid for out of a $90,000 per annum gasoline-tax allotment, and an additional road levy of $20,000 per year takes care of snow-removal work on the county highways. Maintenance work on the state and Federal trunk system is done as authorized by the State Highway Department at Madison, and the State remits funds to Douglas County, upon presentation of an itemized requisition, representing the cost of this maintenance work.

Routine maintenance is carried on steadily, of course, without too much regard to specific authorization. But all first-class repair jobs, such as long stretches of sand blankets and the like, are always authorized before they are started.

The net result, in this northern Wisconsin county, is a smooth-riding well kept highway system. Despite snow, rain, seasonal temperature variation, and the rigors of winter, Douglas County roads serve their people the year round.

Post-Hole Diggers

Tractor-mounted post-hole diggers are manufactured by the Moe Mfg. Co. of Montevideo, Minn. They are for mounting on row crop tractors and are made in sizes to dig either 6 or 9-inch-diameter holes, 3 feet in depth.

The Moes Mole post-hole digger features replaceable tempered-steel cutting edges, a replaceable Meehanite point, ease of attachment, and hand control from the tractor seat. The unit is belt-driven from a tractor drive pulley. It has no gears or universal joints.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 65.

Speco Expands in Ohio

Rustrem production facilities have been expanded by purchase of a 15,000-square-foot building at 7308 Associate Ave. in Cleveland, Ohio, announces Speco, Inc. Also a 5,000-square-foot addition is planned for the company's general offices. The present plant in downtown Cleveland will be used for the time being as a warehouse and for the manufacture of other Speco products. In addition to Rustrem, an anti-rust paint which can be applied directly over rust, the company makes Wood-Rem, a wood-preservative paint; Heat-Rem, a heat-resistant paint; and Freezex anti-freeze.

Staben Named by Oliver

Melvin A. Staben is now District Manager for all industrial business conducted by the Oliver Corp. in the states of Oregon, Washington, Idaho, and Montana. His headquarters will be in The Oliver Corp. offices at 130 S. E. Morrison St., Portland 14, Oreg.

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for contractors, highway officials and distributors wanting further details or printed matter from the manufacturers advertising in these pages. Our Reader Service Department will be glad to forward any literature or special requests you mail to us at the above address.

CONTRACTOR AND ENGINEERS MONTHLY

Concrete Vibrators

Flexible-shaft concrete vibrators manufactured by the W. G. Ingram Mfg. Co., 2008 Sepulveda Blvd., Los Angeles 25, Calif., feature ball-bearing vibrating barrels in four sizes: 1¾, 2⅛, 2⅜, and 2¾ inches. The flexible shafts are provided in three lengths: 7, 12, and 15 feet. Double ball-bearing couplings are available for extension lengths.

The Ingram vibrators are powered by either gasoline engines or electric motors. The standard Ingram motor is rated at 1½ hp and runs on ac or dc. The load speed is 7,000 rpm. The gasoline engine is rated at 4 hp and is a single-cylinder air-cooled unit. It is mounted on a 360-degree swivel base, has an automatic centrifugal clutch with oversize ball-bearing brake shoe, and has a load speed of 7,000 rpm. It can be furnished with or without a wheelbarrow-type mounting on rubber-tired wheels.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 66.

There are no springs or fragile parts in the new Cleco pneumatic-impact wrench which is rated for use with ⅜-inch bolts.

New Impact Wrench

An impact wrench has been added to the line of pneumatic tools manufactured by The Cleco Division of the Reed Roller Bit Co., Box 2119, Houston, Texas. The Cleco wrench is rated nominally for use with ⅜-inch bolts. It is recommended by the company for bolting-up and nut-running, for reaming, tapping, stud-setting, and similar operations. And, the manufacturer states, it can also be used as a drill. A reversing mechanism adds to the uses to which this tool is adaptable. It is operated by a trigger type valve on the handle.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 79.

Information on 34-E Paver

The streamlined Rex 34-E paver is the subject of a catalog released by the Chain Belt Co., 1666 W. Bruce St., Milwaukee 14, Wis. Catalog No. 48-18 illustrates and describes the principal features of this paver, which is built in a single or double-drum style. Among the features listed for it are Hydrocycle control designed to provide completely automatic operation from the finish of the mixing cycle to the closing of the discharge chute; a fast-loading skip; streamlined design for better protection of working parts and maximum accessibility to them; a chain drum drive; and quick-dump placement of concrete.

The catalog describes each of these features in detail. It covers dimensions as well as complete specifications of the Rex 34-E pavers.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 125.

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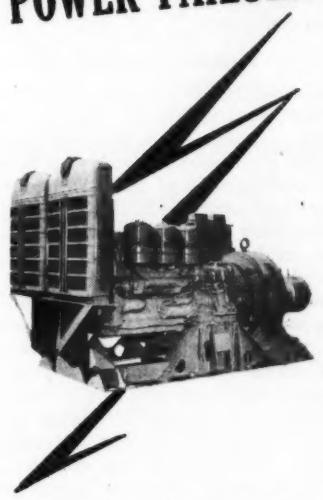

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CONTRACTORS AND ENGINEERS MONTHLY
470 Fourth Ave., New York 16, N.Y.

Concrete-Bent Bridge Is Built With Gantry

(*Continued from page 2*)

were furnished by the State and erected by the contractor. They consist of seven 33-inch WF 132-pound beams on 5-foot centers. The bridge is designed for H20-44 loading.

Over the other spans are five reinforced-concrete girders, one at each row of piles or on 6-foot 11-inch centers. They average 14 inches in width and 2 feet 7½ inches in depth, supporting a 7-inch slab. The roadway is 30 feet wide, with a 2-foot 6½-inch walk cantilevered out on each side. A concrete guardrail completes the structure. On the east end the approach embankment has a 24-foot bituminous pavement flanked by 8-foot shoulders. This work was completed last year under a separate contract.

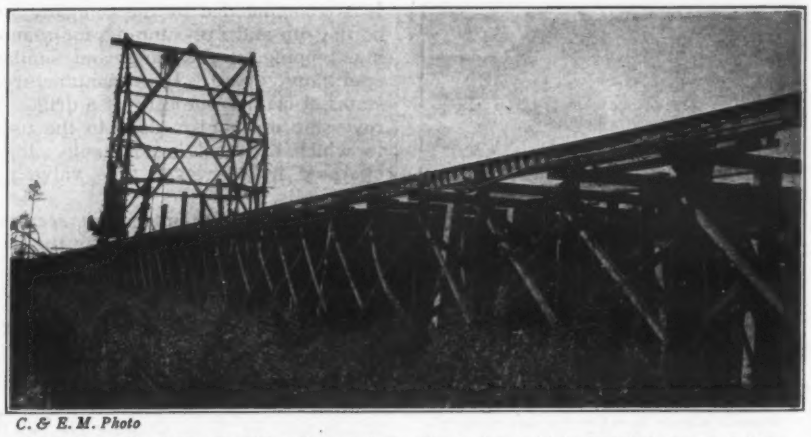
Water Job or Gantry?

The normal flow width of the Perdido is contained within the 62-foot channel span. But the entire bridge site is subject to high water, located as it is on the flat coastal plain of the Gulf of Mexico. Furthermore, the land along the left bank, over which the greater portion of the bridge is built, consists of soft marshes containing muck, clay, and quicksand. The soil definitely could not support heavy bridge-building equipment such as cranes and pile drivers.

Consequently, it looked to the contractor at first glance like a water job, which would involve dredging the site in order to float barges carrying the heavy construction equipment. This method would eliminate much loss of time in case of high water, but would require a dredge together with a lot of other floating equipment. From observing the workings of gantry cranes in Gulf Coast shipyards, the contractor conceived the idea of constructing a gantry with which to build his bridge. Operating it from a trestle, he would be immune from high water, and also from the impractical task of supporting heavy equipment on the boggy river plain.

As an alternate method of driving the piles, a turntable driver could have been employed. But this would have necessitated a falsework structure for the driver and would have involved the problem of transporting the piles from the casting yard to the driver, since soil conditions along the bridge were such as to preclude casting of piles there.

The job got under way in the autumn of 1947 with the clearing and grubbing of the 200-foot right-of-way. Test piles were driven, and the falsework was erected for the gantry which was then assembled and fabricated right at the site. Heavy rains through the winter and early spring kept the job idle until the latter part of March, when the first piles were cast and later driven with the gantry.



C. & E. M. Photo

Since the soil at the Perdido River bridge site is too soft to support heavy bridge-building equipment, Noonan Construction Co. built this timber falsework and a timber gantry to handle and drive the concrete piles.

Timber Falsework

Timber falsework for the gantry was built the full length of the bridge from the east embankment to the Alabama side of the project. It consisted of seven-pile bents, one row of piles to support each of the five concrete girders in the new bridge, with another row at each of the sides to carry the gantry. The bents were on 12-foot centers, with the piles within the bents on the same 6-foot 11-inch spacing as the girders. The piles had 12-inch butts and 7-inch tips, and were from 40 to 60 feet long. They were driven from a walking skid rig equipped with a 4,000-pound drop hammer and an American two-drum hoist which was powered by a 100-hp gasoline engine. Across the tops of the piles, 10 x 10 caps were laid, while the bents were cross-braced, longitudinally and laterally, with 2 x 10's.

(*Continued on next page*)

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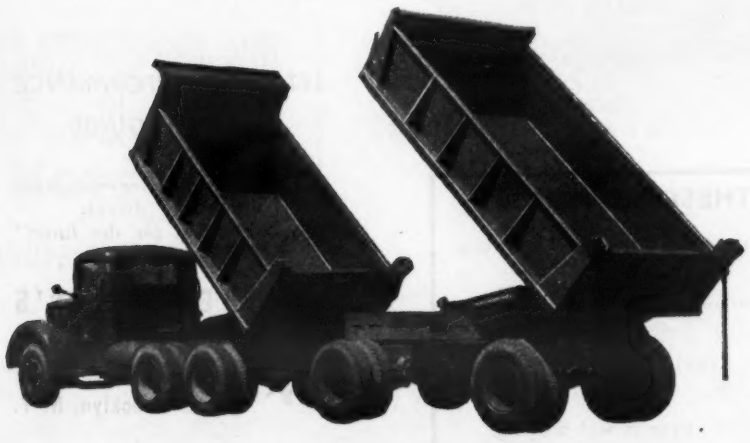

Marion Bodies Illustrated: Tandem tractor unit and four wheel trailer unit mounted on Model HD-10 hoists.

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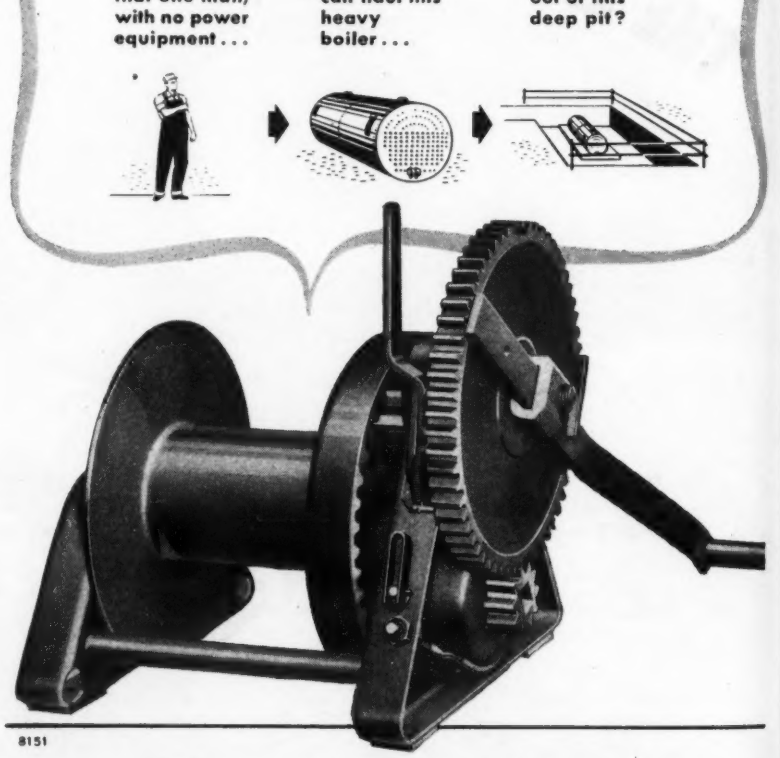

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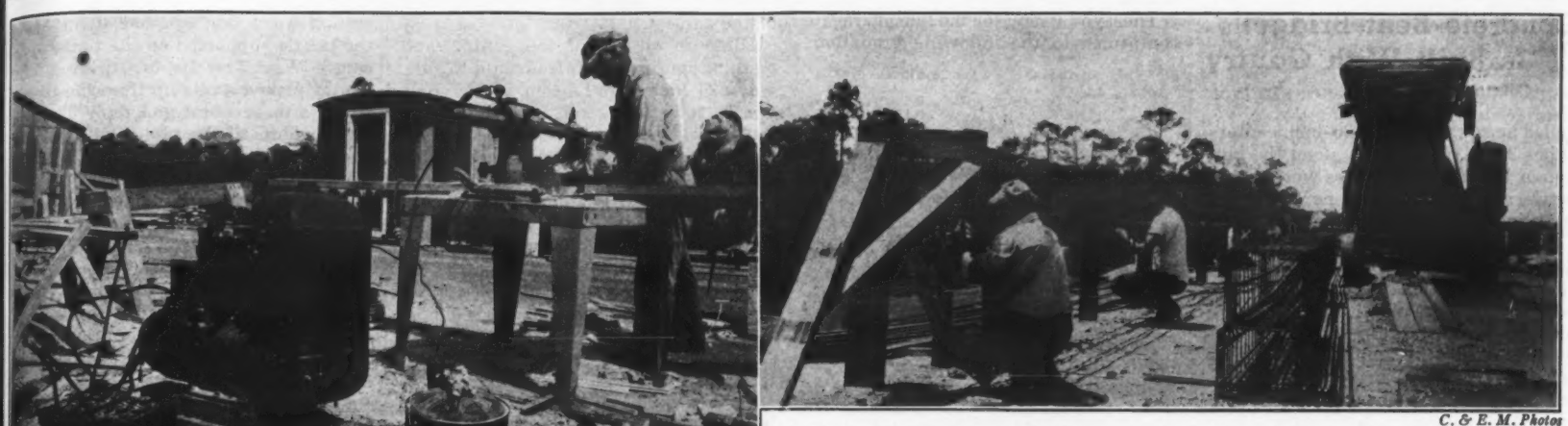

C. & E. M. Photos

A Porter-Cable Speedmatic radial-arm saw is used as a table saw to cut form wedges for the Perdido River bridge (left). It runs off the Fairbanks-Morse gas-electric generator in the foreground. At right, workmen assemble steel reinforcing cages for concrete piles.

Near the ends of the caps two 6 x 12 stringers were stretched between the bents on each side to support the gantry. The stringers were on 12-inch centers, and carried 4 x 6 cross ties, 30 inches long, placed on 20-inch centers. To the ties were spiked 90-pound rails on a 42-foot gage, the width of the gantry. On the north side of the falsework was a 4-foot-wide catwalk protected by a wooden guardrail made of 2 x 4's and knee-braced every 12 feet. The walk was on a level with the gantry, and at 100-foot intervals a 4 x 12-foot work platform was erected adjoining the catwalk, and with a ladder extending down to the ground. This saved a long walk back to the bank when workers wanted to get under the bridge from topside or vice versa. Small tools could also be left on these platforms without cluttering up the catwalk.

The falsework bents were spaced so that the permanent concrete-pile bents of the new bridge came between them. Thus templates were strung across the timber caps of the falsework to guide the concrete piles into their precise location for driving. A couple of 6 x 12's for each pile were secured to the caps, leaving an opening just greater than 18 inches for admitting the pile. Two 2 x 8's were spiked the other way to the 6 x 12's to complete the square template. At ground level, 13 feet below the top of the gantry falsework, another set of templates was laid out with 3 x 8's. Thus with two sets of templates at different levels, the piles were held in position during the driving on either the plumb or battered course, according to the pile being driven.

Pile-Casting Yard

For casting the 124 reinforced-concrete piles used on this project, a pile-casting yard was set up on the east approach fill. The pile forms were laid out along the axis of the roadway with 13 piles in one bed occupying the full width of the embankment, and 7 piles in a bed behind it, taking up half the width of the fill. Thus 20 piles could be cast at a time.

As a foundation, 6 x 12's were laid out transversely across the approach fill on 30-inch centers, supported and leveled at the ends by blocks and oak wedges. Two 2 x 4's were then placed on top of the transverse 6 x 12's, at right angles to them, and on these the individual pile form was built. Bottom and side forms were constructed of ¾-inch boards. The sides were backed with 2 x 4 vertical studs on 16-inch centers, with other 2 x 4's nailed to the top of the studding and running the length of the forms. Cross-bracing of 2 x 4's was

(Continued on next page)

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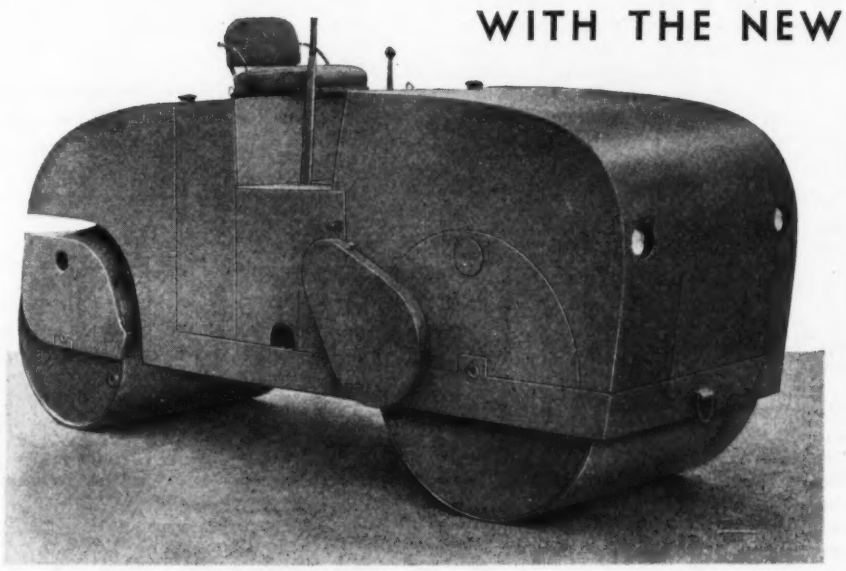

Right side view of the new SEALCOAT TANDEM ROLLER. The seat location allows the operator to see the work in all directions. This, with the conveniently located right-hand clutch lever and the left-hand ball top hydraulic steering lever, permits of easy handling whether working in the open or in corners and confined spaces.

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MAJOR SPECIFICATIONS

POWER—Allis-Chalmers Industrial Model B. 24.5 Brake Horsepower @ 1500 RPM; 27.8 Brake Horsepower @ 1800 RPM. Speeds: 2 forward and 2 reverse give 1.55 to 4 MPH range in either direction.
DIMENSIONS: Wheel Base 91". Length overall—132". Width overall—43". Tank height—57". Ground clearance—13¾". Left side clearance—1½". Right side clearance—3½".
ROLLERS: COMPACTION—Width—38". Diameter—40". Rolled and machined from ⅞" stock.
STEERING—Width—38". Diameter—30". Rolled and machined from ¾" stock.
COMPRESSION—Per lineal inch: Compaction Roller—155 lbs. with ballast. Steering roller—75 lbs. with ballast.
WEIGHTS: Shipping weight (approximately) 6500 lbs. Maximum weight (with ballast) 10,000 lbs. Extra metal weight—600 lbs.

WHEELER TANDEM ROLLER

3 TO 4-TON VARIABLE WEIGHT

This is essentially the same in its sturdy construction and major operating features as the SEALCOAT Roller (above). Power specifications are identical. It is basically different in design and other minor specification differences given below.

MAJOR SPECIFICATIONS

DIMENSIONS: Wheel Base 7'10"; length overall 10'7"; width overall 3'6". Tank height 4'10". Ground clearance 10". Left side clearance 1½".
WEIGHTS: Shipping weight (approximately) 5500 lbs. Maximum Weight (with ballast) 8000 lbs. Extra metal weight 400 lbs.
COMPRESSION: Per Lineal Inch: Compaction roller, 150 lbs. with ballast. Steering roller, 70 lbs. with ballast.
ROLLERS: COMPACTION—Width—36". Diameter—37". Rolled from ⅞" stock.
STEERING—Width—34". Diameter—27". Rolled from ¾" stock.
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Concrete-Bent Bridge Is Built With Gantry

(*Continued from preceding page*)

nailed across the top on 30-inch centers. Other 2 x 4 runners ran along the bottom of the forms. Wedges were driven between the bottom runners and the studs in order to plumb the sides.

A great deal of the form work was done with a Porter-Cable Speedmatic electric saw. On this job the saw, equipped with a radial arm and a 10-inch blade, was set up as a table saw, but it can also be employed as a portable saw. It was driven by a Fairbanks-Morse gas-electric 3-kw generator.

The steel reinforcing cages for the piles were assembled just behind the casting yard. An assembly framework was erected, consisting of 4 x 6 posts set in the ground on 7-foot centers. At the tops of these posts, in line, were nailed 2 x 6's 4 feet long. Thus two cages, one on each side, were assembled on these 2-foot overhanging members. When completed they were lifted off and placed in the pile forms. Reinforcing was supplied from the Virginia Steel Co. plant at Birmingham, Ala., and was hauled to the job site in trucks from the steel plant.

Concrete Plant

Other materials used in the concrete operations included Lehigh high-early-strength bag cement which was shipped from Birmingham by rail to a siding of the St. Louis-San Francisco Railroad, and hauled 12 miles from there to the job site in trucks. It was stored in a 24 x 36-foot Armco metal shed, made of prefabricated steel panels. Gravel for the coarse aggregate was also shipped to that same siding from the Roquemore Gravel & Slag Co. at Montgomery, Ala., and was unloaded by a conveyor belt into trucks that hauled it to the job. The Ward Gravel Co. of Flomaton, Ala., furnished the sand, delivering it after a 30-mile haul by trailer truck.

Batches were weighed out in wheelbarrows on a Winslow scale and dumped into the skip of a Ransome 16-S mixer. Cement was added, and the water, which was pumped from the river by a Jaeger pump that was also used for jetting when the piles were being driven. A 2-inch line ran from the pump to a 1,000-gallon storage tank near the mixer. The concrete was dumped into the forms from wheelbarrows and vibrated with Mall vibrators.

Provisions were made for pick-up points on these long, heavy piles. Near the upper end a 2½-inch paper tube was inserted in the concrete. This left a hole for the insertion of a 2-inch pin through the center of the pile for a future pick-up point. Two other pick-up points were provided near the bottom of the pile by embedding ⅞-inch bent U-bars into the concrete. In a 55-foot pile, for instance, a U-bar was placed 8 feet 9½ inches from the tip, another U-bar 28 feet from the tip, and the hole for the pin was located 47 feet 4 inches from the tip, or 7 feet 8 inches from the top of the pile.

The concrete was cured with burlap and water, and with the use of the high-early cement, the piles were picked up from the forms in five days, and were driven in seven days after casting. The weights of a typical three-bag batch were as follows:

Cement	282 lbs.
Sand	501 lbs.
Gravel	951 lbs.
Water	17 gals.

The gradation of the No. 9 gravel used as the coarse aggregate was as follows:

Sieve Size	Per Cent Passing
1½-inch	100
1-inch	95-100
¾-inch	80-100
½-inch	37-70
⅜-inch	5-30
No. 4	0-7

The Type 1 sand for the fine aggregate conformed to the following gradation:

Sieve Size	Per Cent Retained
No. 4	0-5
No. 8	0-15
No. 16	3-35
No. 30	30-75
No. 50	65-95
No. 100	95-100

The Gantry

The gantry was 65 feet high x 42 feet long and 42 feet wide. Four-inch timber rings were used in all timber-to-timber connections and 4-inch shear plates were used where timber joined steel. The timber framework was practically all 8 x 8's, bolted together with ¾-inch bolts which passed through ½-inch steel plates at the corner connections for added strengthening and stiffening. The horizontal members were on three levels or planes, 16 feet apart. Because of the long piles that it handled, the gantry could have no cross-bracing at the bottom, for that would have interfered with the carrying and placing of the piles in the templates. Along the bottom, however, on each side, the gantry had two 6 x 12 runners into which the wheels were framed.

Movement along the rails was on these eight double-flange 20-inch-diameter steel wheels, two of which rode in tandem at each corner. The two forward sets of wheels—that is, at the end of the gantry away from the shore—were propelled by a chain sprocket drive hooked up on each side to a separate Gardner-Denver Model HBA air motor. With these the gantry moved horizontally at the rate of 85 to 90 feet per minute. A Jaeger 105-cfm air compressor to supply the air was carried along on a platform built over the runners on the forward south side of the gantry.

High up on top of the gantry, and running its full width from side to side, was a 24-inch steel I-beam, 50 feet long. On the lower flange of the beam rode a trolley with a Beebe 15-ton hoist. This beam extended out over the south side of the framework, enabling the hoist to pick material or equipment off the ground. An Ingersoll-Rand air motor drove both the trolley along the beam and also the hoist which could lift at the speed of 2½ to 3 feet a minute, either empty or loaded. The hoist was simply a hand hoist powered by an air motor. The comparatively slow lifting speed of the gantry the contractor had hoped to overcome by using a high-speed air hoist, but he was unable to buy one.

Pile Driving

The gantry picked the piles up at the casting yard and spotted them along the trestle supported on the timber pile caps. When ready for driving, the gantry picked a pile up from the trestle with its three-point pick-up. The two lower points of the pile fitted out with the U-bolts were lifted by a Tulsa single-drum hoist powered by a Wisconsin gas engine. This unit was located on a platform at the forward north end of the gantry with the hoist hung from the first transverse member of the framework. A bridle was passed over the 2-inch steel pin at the upper pick-up point and connected with a four-way reeve to the main 15-ton hoist hung from the I-beam. The weight of the entire pile was gradually shifted to the latter hoist, and the pile was then suspended vertically and fitted into the templates. The U-bolt pick-ups were

(*Continued on next page*)

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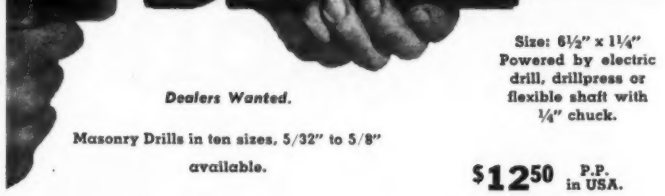

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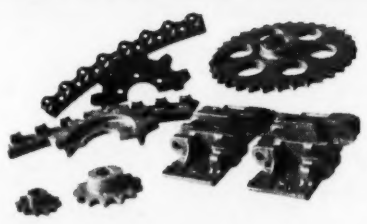

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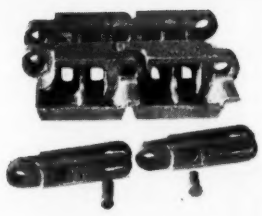

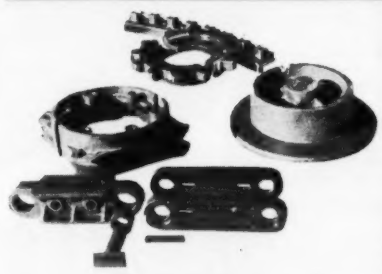

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burned off so as to admit the pile into the frame.

Then the pile was jetted into the ground for the initial 8 feet as a general average. A Jaeger jet pump was set up on a platform at the edge of the river to pump water both for the jets and for the concrete when a pour was being made. The pump had a 6-inch intake, but pumped water through a 4-inch line to two 2-inch jet pipes 50 feet long. The jet pipes were hammered down at the ends to a 1½-inch opening; the pressure used in jetting was 200 psi. The jet pipes were raised or lowered by an I-R two-drum air hoist.

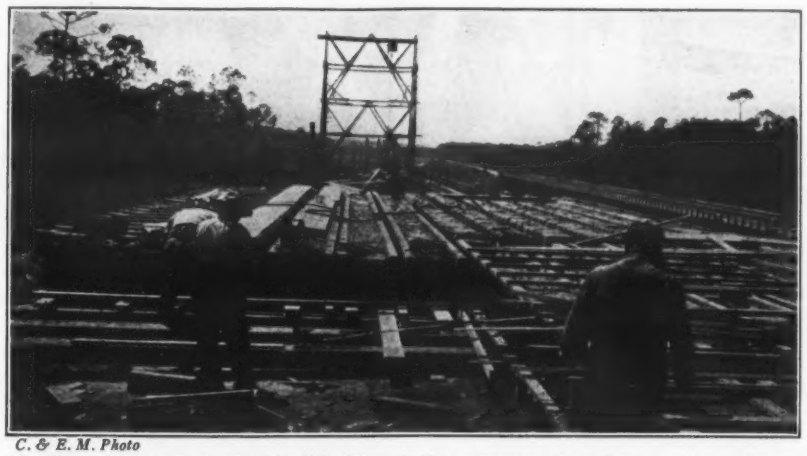
A Vulcan No. 1 single-acting hammer, framed in steel leads, was then placed on top of the pile with its bonnet coming down 3 feet along the sides. The complete rig was hung from the main hoist. Steam for the hammer was supplied by a 150-hp oil-burning boiler which was carried on a platform located at the south side of the gantry near the back end. The boiler had been converted from coal to oil. The piles were then driven both by jetting and hammer blows until within the last 3 feet; then the hammer alone was used. When the jets were employed, they were kept about 3 feet above the bottom tip of the pile. The piles were driven to 44-ton bearing.

In order to hold the hammer always plumb on top of the pile, a line was run from the hammer to a Beebe 5-ton manually operated hoist rigged up on the north side of the gantry frame near the rear. The usual procedure was first to set up the five piles of a bent within their respective template framing, and then drive them down through the muck, silt, and poor-quality sand to the fine-grained, hard-packed white bearing sand which was normally reached at minus 20 elevation. Mean low water is at 0 elevation, Gulf datum.

The gantry set and drove an average of 20 piles a week. Its movements were controlled by two operators, both stationed on the south side of the rig: One at the center operated the air hoist that powered the jet lines, while the other, sitting forward of the compressor, controlled the propelling air motors and the main hoist which handled the piles and the hammer. A fireman tended the boiler. The other hoists were looked after by the pile-driving crew.

Bridge Superstructure

After a pile bent was driven, the forms for the caps were next constructed. First 6 x 12's were bolted along the sides of the piles transversely across the bent, with other 6 x 12's going under these at each pile. These friction collars were held in place with ¾-inch bolts, threaded at each end. Across these members 2 x 6's were placed to serve as the bottom of the cap form. Side forms for the 32-foot caps were made up in 16-foot panels of ¾-inch stock, faced with ⅜-inch plywood and backed with 2 x 6 studs on 16-inch centers. Along the top went double 2 x 4 wales, with Universal ½-inch form ties on 30-inch centers. The sides were also braced to the caps of the adjoining gantry trestle.



C. & E. M. Photo

A pile-casting yard for the Perdido River bridge job was set up here on the east approach fill. Piles that have been poured are shown being cured with water and burlap.

The gantry handled all materials used in the construction of the bridge, carrying them out from the shore and spotting them over the trestle. After the caps were poured, the deck forms were built over the gantry trestle, and supported on the timber caps. Concrete was mixed on shore, discharged into ¾-yard buckets, and carried by the gantry to the forms.

Quantities and Personnel

The major items in the Perdido River bridge contract included the following:

Concrete	1,231 cu. yds.
Steel reinforcement	264,340 lbs.
Precast 18-inch concrete piles	6,306 lin. ft.

Noonan Construction Co. has em-

(Concluded on next page)

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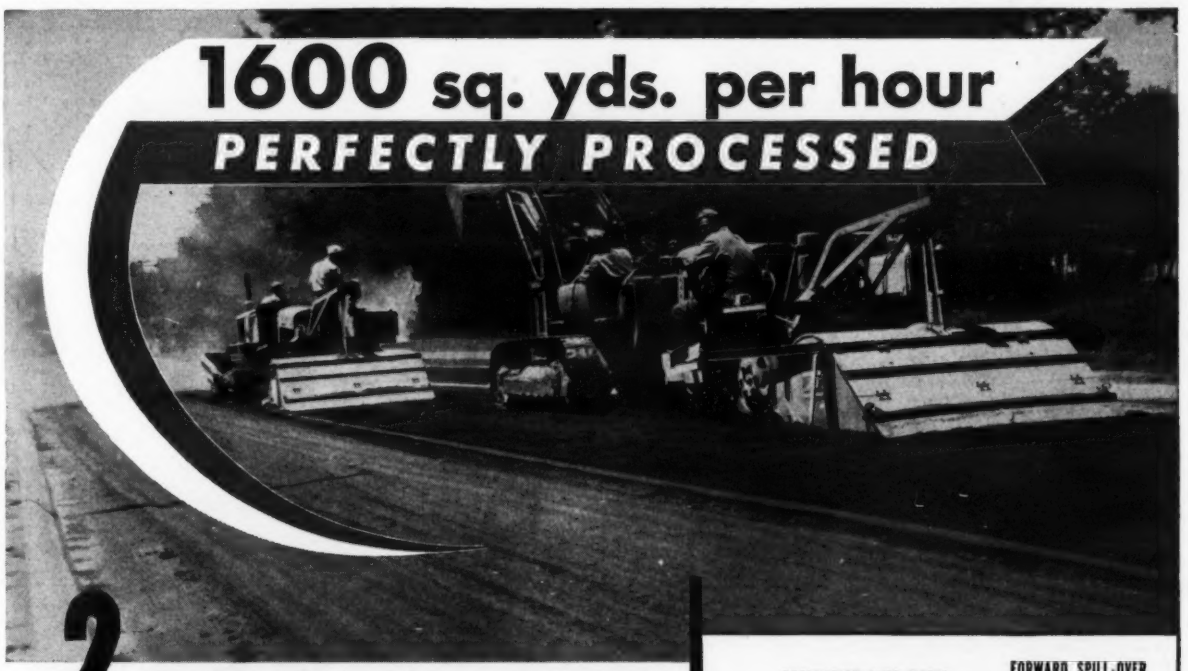

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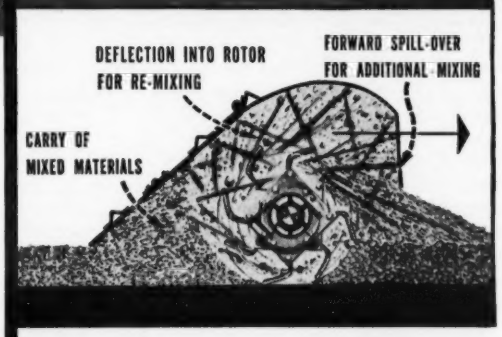

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C. & E. M. Photos

At left, on the Noonan job, are Superintendent H. J. Wilson and Inspector C. E. Matthews standing under the manually operated Beebe hoist. The two forward wheels on each side of the gantry (photo above) are propelled by a chain sprocket drive. At right, 3 piles of a 5-pile bent have been set; the battered pile farthest away is being jetted. You can see the operator of the I-R 2-drum air hoist which controls the jet pipes. At far right is the Jaeger 105-cfm air compressor which rides on the gantry.

Concrete-Bent Bridge Is Built With Gantry

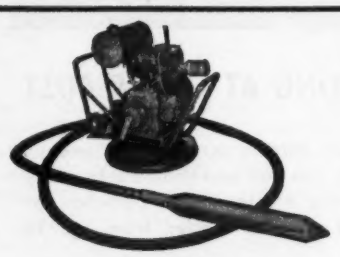
(Continued from preceding page)

ployed an average crew of 50 on this project. The idea of the gantry was conceived by Charles Soule, a member of the firm, who designed it and then, with his brother William Soule, General Superintendent, supervised its fabrication and erection. H. J. Wilson serves as Job Superintendent.

For the State Road Department of Florida, Corbin Cawthon is Project Engineer, having succeeded J. D. Gregory, deceased. C. E. Matthews is Chief Inspector. The project is located in Division 3 of which George L. Dickenson is Division Engineer with headquarters at Chipley. F. Elgin Bayless is Chairman of the Department and E. C. DeGarmo is State Highway Engineer at Tallahassee.

Key Changes for Koehring

John S. Conway has succeeded J. F. Robbins as General Sales Manager of the Koehring Co. of Milwaukee. Mr. Conway formerly held the position of Export Sales Manager. Appointed to succeed him in this position is R. E. Stewart, and John E. Chadwick is named Assistant Sales Manager. Mr. Robbins left the Koehring Co. to assume the post of President and General Manager of the Capitol Equipment Co., a Koehring distributor in Harrisburg, Pa.



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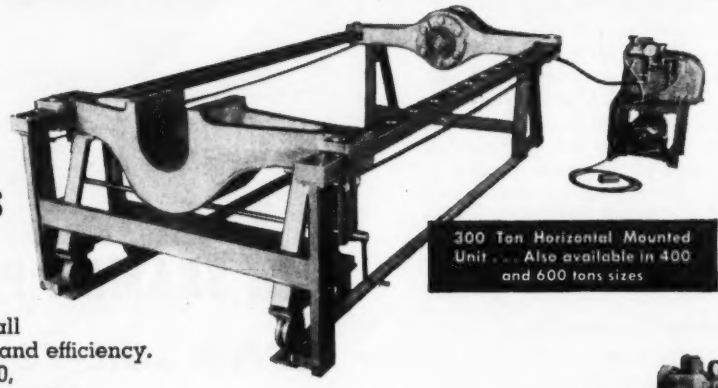

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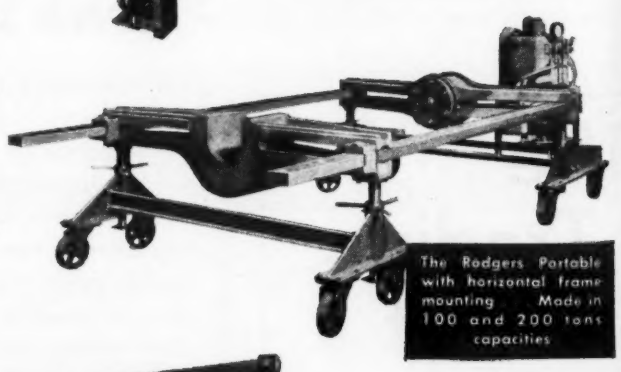

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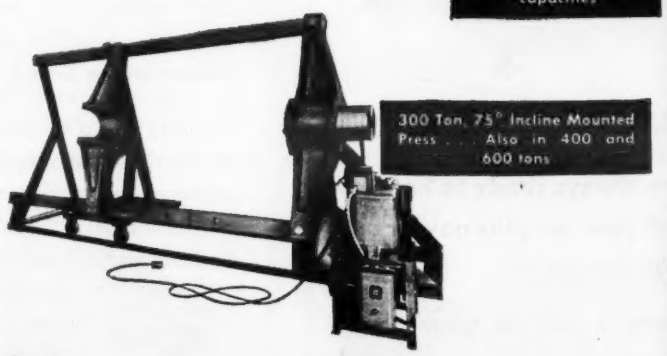

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Annual meeting, Highway Research Board, National Academy of Sciences and National Research Council Building, 2101 Constitution Ave., Washington, D. C. Roy W. Crum, Director, 2101 Constitution Ave., Washington 25, D. C.

Jan. 10-14—Materials Handling Show
Materials handling show, American Society of Mechanical Engineers and Materials Handling Institute, Convention Hall, Philadelphia, Pa. Clapp & Poliak, Inc., 350 Fifth Ave., New York 1, N.Y.

Jan. 16-20—AED Meeting
Annual meeting, Associated Equipment Distributors, Stevens Hotel, Chicago, Ill. Frank G. Knight, Executive Secretary, 360 N. Michigan Ave., Chicago 1, Ill.

Feb. 28-March 3—AGC Convention
Annual convention, Associated General Contractors of America, Inc., Waldorf-Astoria Hotel, New York, N. Y. H. E. Foreman, Managing Director, Munsey Bldg., Washington 4, D.C.

Feb. 28-March 4—ASTM Meeting
Spring meeting and Committee Week, American Society for Testing Materials, Edgewater Beach Hotel, Chicago, Ill. C. L. Warwick, Executive Secretary, 1916 Race St., Philadelphia 3, Pa.

Roadside Pay Telephones Find Favor with Drivers

Favorable public response to the roadside pay telephones established by the State of New Jersey has led to the approval of two additional units. These roadside telephones are located, as an aid to motorists in areas which are without facilities, for summoning aid in the event of breakdowns.

The two new booths will be located on Route S-3 under construction in Clifton, Passaic County. They will be approximately one mile apart—one on the south side of the highway, about 1,000 feet west of Bloomfield Avenue, and the other on the north side about 600 feet west of Colin Avenue. At these locations the paving will be of extra width to allow turnouts by buses and trucks.

The first roadside booths erected by the State—and thought to be the first in the nation—were at three stations on Route 25 between North Avenue, Elizabeth, and Port Street, Newark. New Jersey's First Parkway, Route 4, will also have three phones. Agreements of the Highway Commissioner with the New Jersey Bell Telephone Co. now cover eight phones along various state routes.

Cement Co. Agent in NYC

The Lafarge Aluminous Cement Co., Ltd., of London, England, has appointed an American sales representative. He is Gerald T. Haddock, 311 E. 72nd St., in New York City. Mr. Haddock will handle the sales of Ciment Fondu Lafarge throughout the United States. He formerly held the position of Sales Promotion Manager for the Lumnite Division of the Universal Atlas Cement Co.

Data on Utility Tractor

A 24-page catalog about the HD-5 crawler tractor has been released by the Tractor Division of the Allis-Chalmers Mfg. Co., Milwaukee 1, Wis. The catalog is printed in two colors and features the unit's ability to meet the varied needs of the county, township, or contractor.

Space is given in the catalog to the unit's A-frame track stabilizer, track-release mechanism, positive-sealed truck wheels, tapered roller bearings, 14-inch master clutch, transmission, heavy-duty equalizer springs, and the full-width crankcase guard. Also described are the unit injection, 4-way cooling, and performance features.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 48.

Best Selling! Best Serving! Best Values!

CHEVROLET *Advance-Design* TRUCKS

All over the country, the favorite trucks are Chevrolet Advance-Design trucks, and for good reason, too, for they're first in value. Compare them, feature for feature—value for value! You'll find they bring you more and cost you less, for Chevrolet trucks have 3-way thrift—*triple economy*—with low operating costs, low upkeep costs and the *lowest list prices in the entire truck field!* See your Chevrolet dealer.

CHEVROLET MOTOR DIVISION, *General Motors Corporation*, DETROIT 2, MICHIGAN

CHEVROLET

Check These Features! Only Chevrolet Advance-Design Trucks Have Them All!

Quicker, quieter and easier operation is assured with Chevrolet's new 4-SPEED SYNCHRO-MESH TRANSMISSION in one-ton and heavier models. Faster shifting maintains speed and momentum on grades.

Mounted on the steering column, the new Chevrolet GEARSHIFT CONTROL offers new convenience and ease in all models with 3-speed transmissions.

World famous for its outstanding economy, Chevrolet's powerful VALVE-IN-HEAD ENGINE provides IMPROVED durability and operating efficiency.

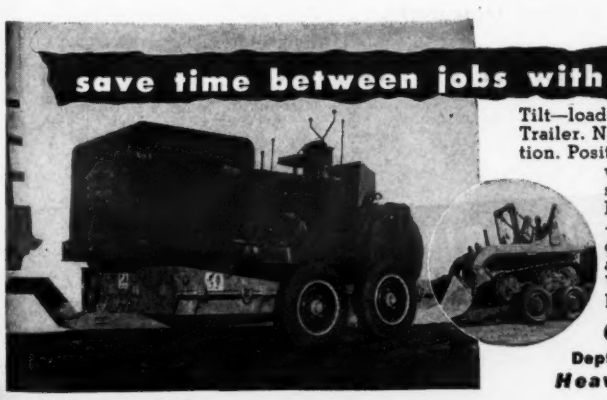
The revolutionary Advance-Design FOOT-OPERATED PARKING BRAKE provides new convenience and greater clear floor area in models with 3-speed transmissions.

Heavy-duty models have greater strength and durability with Chevrolet's new SPLINED REAR AXLE HUB CONNECTION.

The Cab that "Breathes"* • Flexi-Mounted Cab • Uniweld, All-Steel Cab Construction • Large, Durable, Fully Adjustable Seat • All-Round Visibility with Rear-Corner Windows* • Heavier Springs • Super-Strength Frames • Full-Floating Hypoid Rear Axles on ¾-Ton and Heavier Duty Models • Specially-Designed Brakes • Standard Cab-to-Axle-Length Dimensions • Multiple Color Options.

*Fresh air heating and ventilating system and rear corner windows optional at extra cost.

save time between jobs with JAHN TILT TRAILERS



Tilt—load—and you're off in a matter of minutes with a Jahn Tilt Trailer. No jacks or loading ramps required. One-man operation. Positive, automatic safety lock holds platform in position when loaded or empty. Rubber mounted drawbar absorbs road shocks and protects both truck and trailer. Ideal for transporting tractors—rollers—compressors—shovel-loaders—mixers, etc. Jahn Tilt Trailers are available in 8 ton capacity tandem axle and 5 ton capacity single axle models. Write for specifications and illustrated bulletin or see your nearest Jahn distributor.

C. R. JAHN COMPANY
Dept. 1347 —1106 W. 35th Street, Chicago 9, Illinois
Heavy duty trailers from 5 to 100 tons

BUY U.S. SECURITY BONDS NOW!

Pre-Stressing Concrete Keeps It in Compression

A folder which describes a method of pre-stressing concrete so that it is always in compression, for any design live loading, has been prepared by the John A. Roebling's Sons Co., 640 S. Broad St., Trenton 2, N. J. Adding a high-strength wire to the concrete slab transforms the concrete into a flexible material with a high tensile strength, Roebling explains.

The folder illustrates the design of three concrete structures in various lengths, showing how the wires are located and indicating the cost of this type of construction. It describes how the concrete is subjected to initial compression in both horizontal directions by means of the wires, and how these wires serve to produce the compression loading. The folder mentions the depths of slab practical with this type of construction, and indicates alternate methods of construction for deeper slabs.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 42.

Charles H. Sells Retires

Charles H. Sells has retired as State Superintendent of Public Works for New York, to return to private practice as a consulting engineer. He is succeeded by B. D. Tallamy, formerly Chief Engineer of the Department. Mr. Sells was appointed Superintendent on May 20, 1943. He had previously been Commissioner of Public Works for Westchester County in New York. Mr. Tallamy joined the Department in 1945 as Deputy Superintendent, and became Chief Engineer on July 1, 1947.

Rubber-Tired Compactor

A 200-ton rubber-tired compaction roller is described in an illustrated folder now being distributed by O. J. Porter & Co., 516 Ninth St., Sacramento, Calif. Featured in the catalog are 8 large-size illustrations of the roller showing its general arrangement, comparative size, component parts, and other points of interest. Accompanying text describes the construction, operation, and features of the Porter compactor.

Illustrations show the subgrade-testing unit, with hydraulic jack, weighing cell, and the pump which delivers oil for the jack; the four screw jacks for raising and lowering the front of the boxes, for raising and lowering the tongue when making connection to the pull tractor, and for providing a rigid front reaction when making plate-bearing tests; the oscillating action of the unit designed to provide uniform ground pressure and compaction on uneven ground; the 60-ply 30.00 x 33 tires; and side and overall views of the whole compactor.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 96.

Marquette's Golden Year

The 50th anniversary of its founding was celebrated this past summer by the Marquette Cement Mfg. Co. of Chicago. The celebration took the form of birthday parties at the main plant and also at the other plant towns: Cape Girardeau, Mo.; Des Moines, Iowa; Nashville, Tenn.; and Cowan, Tenn. These parties featured barbecue picnics, vaudeville acts, prizes, band music, and evening displays of fireworks.

When The Drifts Pile High

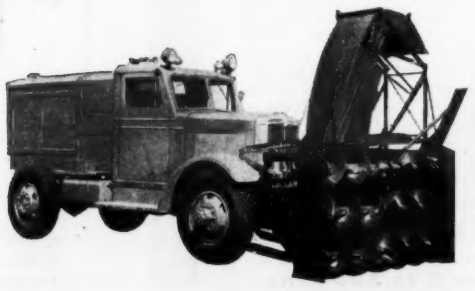
● Marmon-Herrington, the world's foremost builder of *All-Wheel-Drive* trucks, offers you the benefits of extraordinary engineering experience gained in snow-fighting service the world over—from Maine to Washington and in remotest arctic regions.

Moreover, Marmon-Herrington offers you the world's most complete line of *All-Wheel-Drive* trucks—regular models and *All-Wheel-Drive* converted Fords. Whether your work calls for V-plows or rotary, there's a Marmon-Herrington Truck in the right size, at the right price, to fit your needs exactly. Gross vehicle weights range from 4,700 pounds to 42,000 pounds—horsepower from 95 to 145.

Marmon-Herrington Trucks combine *All-Wheel-Drive* power and traction with an exceptionally wide range of gear ratios (up to 10 forward speeds and 4 reverse). Thus they have the sure-footed tractive-power to clear deepest drifts, hard-packed snow and ice-encrusted surfaces with spectacular speed and ease.

For convincing proof, let your nearby Marmon-Herrington dealer demonstrate the amazing ability of these great *All-Wheel-Drive* trucks.

MARMON-HERRINGTON COMPANY, INC. • INDIANAPOLIS 7, INDIANA



MARMON-HERRINGTON
All·Wheel·Drive

Dredging Job Uses 17,000-Foot Lines

"George W. Catt" Teams Up With "Texas" of AG&P Dredge Fleet to Deepen Houston Ship Channel

+ IN an interesting demonstration of pumping through pipe lines up to 17,104 feet in length, two of Atlantic, Gulf & Pacific Co.'s dredges—the George W. Catt and the Texas—recently deepened a part of the Houston Ship Channel to 36 feet. The $600,000 job, involving 2,000,000 cubic yards of dredging, was pushed rapidly to completion for the Galveston District Office of the Corps of Engineers.

Despite the fact that this was strictly maintenance dredging, some unusual dredging conditions cropped up. Entrapped gas in the silt in the turning basin broke pump suction when it was drawn up into the 24-inch centrifugal pump of the Texas, and lowered the dredge's normal yardage. On the venerable George W. Catt, unusually high pumping loads were put on her main turbine by installing a huge 95-inch runner, which develops about 125 pounds of pipe-line pressure to force the dredged solution to the dump.

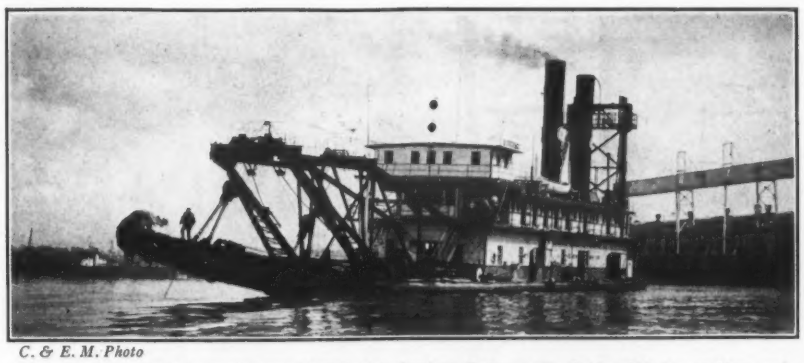
The George W. Catt successfully handled material on a 17,104-foot pipe line, and raised the load 56 feet above the surface of the water—all without the help of boosters.

Catt Digs Bulk of Yardage

The Catt dredged about 1,500,000 cubic yards in 16,400 linear feet of channel. The Texas handled about 500,000 cubic yards in the turning basin and approaches, close to the city of Houston. The Houston Ship Channel is from 200 to 300 feet wide, and with the turning basin was cleaned up to a depth of 36 feet. One foot of allowable overdepth excavation was also generally removed.

As the Catt proceeded up the channel from the lower end of her contract at station 1284+00, she also cleaned up alongside some of the wharves which line the channel banks. She reached these locations by swinging over a 300-foot cut, and payment for that work was made privately by the various industrial firms for whom it was done. The clean-up work at these points made about 31 feet of depth available to shipping.

The AG&P job also included extensive levee work, which raised the existing embankment enclosure around the old Government dump grounds to elevation 52. The main dump on the project was a huge plot of land 7,000 x 1,800 feet. Since the low ground all around this area is filled with homes, timber spillways had to be used to regulate the height of water impounded and to discharge it into ditches that carried the clear water back towards the ship channel. The cost of building these levees and erecting timber spillways was a part of the dredging price of $0.2697 per cubic yard for the muck.



C. & E. M. Photo

This picture off the port bow shows the dredge George W. Catt with its cutter and ladder raised to remove clogged clay and trash.

Dredging Is Badly Needed

For several years the silting situation in the Houston Channel had been so bad that vessels literally slid through the muck and ooze. Since the last maintenance job had been done, some years ago, several feet of silt had come in and settled on the channel floor. Vessels had to lighten their loads to get in and out. Often they were grounded.

A general curtailment of all Federal flood-control and navigation works in 1946 delayed still further the dredging work, and funds were not made available until late in the autumn of 1947. Work began on the levees on December 1, and by January 11 the Catt was able to start. Shortly thereafter the Texas got busy in the turning basin. The job was completed March 23, 1948.

The blue, fine muck dug easily, but frequently the cutter clogged with heavy clay from the side slopes, pieces of castaway cable, and other debris. A ship had recently lost overboard two bales of fine East Indian burlap. The Catt's cutter, nosing along, ripped the bales open, so that they clogged the whole front end. One of the deckhands who helped to free the mess said, "I reckon that burlap was clear through the suction pipe and pump, and down the pipe line past the stern swivel."

The levee construction was done under a subcontract with W. C. Wells, Jr., of Beaumont. Wells used two 1½-yard draglines—a Northwest and a Link-Belt—casting with 55-foot booms, to erect the levees. The material was dug out of the old borrow area formed by previous dredge dumps.

Trapped Gas Causes Trouble

One of the most unusual problems of

(*Continued on next page*)

A swingin' and a diggin'—with the aid of a 3-ton skull cracker, the Amsco All-Manganese-Steel Welded Type Dipper above is shown helping to demolish and clear 18 square blocks of Manhattan's lower East Side. Out of this seeming destruction will rise housing accommodations to give the families of 8,761 veterans a toe-hold on the future.

Wherever better living is being provided for tomorrow . . . building sites, highways, mines, dams, quarries . . . there you will find Amsco dippers digging, filling, transferring and loading. They keep every type of project moving at top speed because they give extra service day after day without repair and maintenance delays.

Amsco All-Manganese-Steel Welded Type Dippers, also shown here on a quarry operation, feature plug-welded, overlapping castings for maximum strength with minimum weight. Amsco All-Manganese-Steel Renewable Lip Dippers, shown here on a coal stripping operation, have extra ruggedness throughout plus a quickly removable and replaceable lip for high speed repair. Correct design assures fast, full loading; with minimum "crowd" and quick, complete dumping. Use of "the toughest steel known" throughout adds efficiency and multiplies service life. While the body metal stays tough, the surface work-hardens and polishes under impacts to as high as 550 Brinell to fight abrasion and improve penetration and dumping. Send for Bulletin 547-DS.

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AMERICAN Brake Shoe COMPANY

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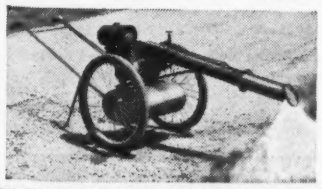
Foundries at Chicago Heights, Ill., New Castle, Del., Denver, Colo., Oakland, Calif., Los Angeles, Calif., St. Louis, Mo.
Offices in principal cities. In Canada: Joliette Steel Limited, Joliette, Que.

WOOLERY "AJX" WEED BURNER



Burns ALL Weeds fast in ditches and along fence rows. Cleans up yards. Thaws frozen ground, pipes, hopper bottom cars, etc. Burns out stumps. Light weight. Easy to handle. Prompt Delivery. Low price.

Write for FREE catalog today.

WOOLERY MACHINE CO.
2907 Como Ave. S. E. Minneapolis 14, Minn.

Dredging Job Uses 17,000-Foot Lines

(*Continued from preceding page*)

the job arose when the Texas, up in the turning basin, began to hit big pockets of trapped gas. This gas is caused by the many tons of industrial and sewage waste dumped in the ship channel, which settle to the bottom and form gas pockets.

When a dredge cutter hits a gas pocket, the powerful vacuum draws it up through the suction pipe into the dredge pump. When it enters the pump, the suction is broken momentarily, and the pump starts to run away. When it again picks up its load of muck and water, rams and high stresses are set up, with dredge output dropping off.

Some methods to dissipate the gas before it could enter the pump were tried out under the direction of Paul B. Miller, Southern Manager of AG&P, in cooperation with the Corps of Engineers.

A small-diameter cutter, with its back ring equal in size to the nose ring on the main cutter, was welded at that point to the main cutter frame. This actually made a stub nose ahead of the main cutter, far out ahead of the suction intake, which broke up the gas pockets and released the gas.

As most dredgemen know, however, this method has a disadvantage. To begin with, it will not dissipate all the gas, and enough of the material still enters the suction to be detrimental. Too, the stub nose is useless as far as actually cutting any material is concerned, and it increases the drag on the swing anchors.

So a change in method was devised and a gas ejector was installed on the suction intake. The gas was light, of course, and rose towards the top of the suction pipe. A 6-inch standpipe was welded in the top of the suction pipe, with a vacuum ejector activated by a steam or water jet, at the top. Since, to be successful, the device had to overcome the pump suction, it had to be carefully spotted in the line.

However, some work of this sort by the Philadelphia U. S. Engineer District on one of its own dredges is reported to have increased its effective output by 75 per cent, according to R. R. Manatt, Assistant General Superintendent under S. H. Ware, General Superintendent in AG&P's Houston office.

Dredging Methods

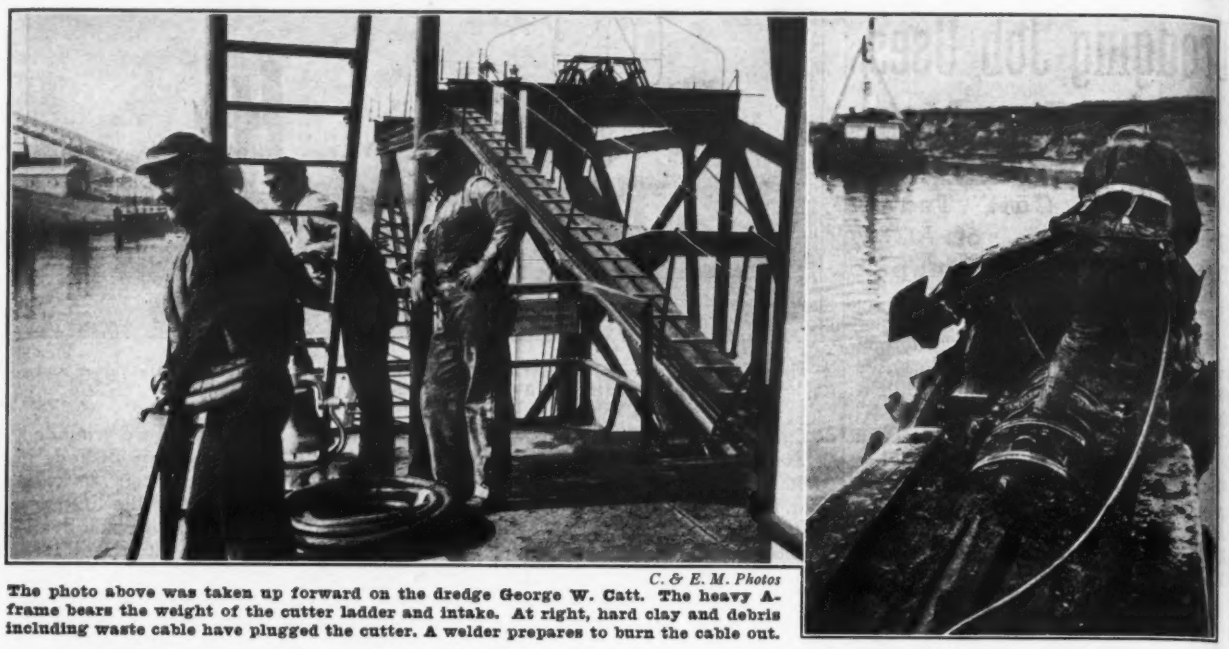
The Texas and the Catt operated the way hydraulic suction dredges have been operated for years along the Gulf Coast. Since the Catt dug most of the project and is the larger, more powerful machine, emphasis is therefore placed on her part of the work.

She started in at the lower end of the contract at the furthermost point from the Houston turning basin, and began to dredge upstream. Shore connections to join the floating pipe line to her land pipe lines were placed on the north bank at intervals of about 1,500 feet, though this interval could be stepped up to coincide more nearly with the 2,700 feet of floating line available.

The bank along the ship canal is steep and high, so it was necessary to bring in a P&H Model 150 dragline and dig a ramp from high ground down to the water. This permitted men and equipment to make up the land joints without difficulty, after the joint was made at the water line.

The Catt's floating pipe line was made up in 40-foot sections. Each section was fitted at the ends with ball joints of AG&P's own design. These joints can be made up with only one bolt, simply by meeting the male and female ends and turning a large metal keeper ring until its holes line up with holes in the lugs on the other joint. The ring

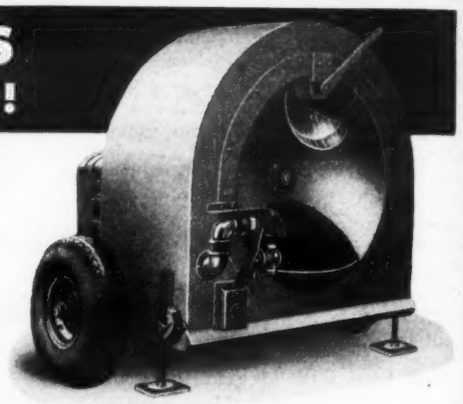
(*Continued on next page*)



C. & E. M. Photos

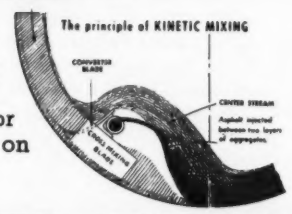
The photo above was taken up forward on the dredge George W. Catt. The heavy A-frame bears the weight of the cutter ladder and intake. At right, hard clay and debris including waste cable have plugged the cutter. A welder prepares to burn the cable out.

EIGHT TO TEN BATCHES
. . . more per barrel of Asphalt!



HERE is an unusual mixing principle in an asphalt mixer that assures maximum coating of aggregate with the minimum of asphalt.

The action of the converter blade and cross mixing blades sets up a mulling action and forces the faster moving materials through the slow ones. In addition the asphalt is introduced *under pressure* into the middle and within the aggregate stream. This unusual mixing action means a better mix and material savings in asphalt.



The Kinetic Asphalt Mixer is a compact, fully portable unit that can be towed behind car or truck. It delivers 3 cu. ft. of mix in 30 seconds and will handle either hot or cold mixes. Ask for folder K-100 which gives full details on mixing principle and design.

the FOOTE *Kinetic* mixer

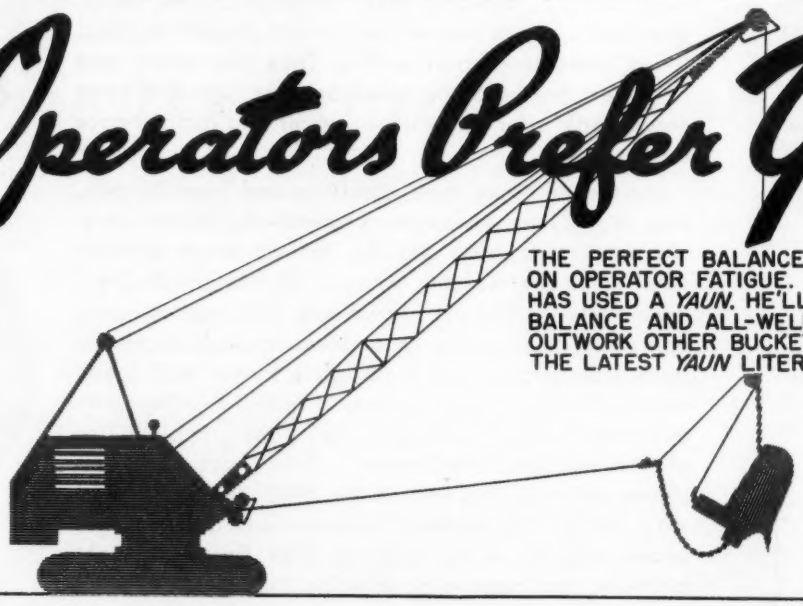
THE FOOTE CO, INC.
Subsidiary of Blaw-Knox Co.
1916 State Street, Nunda, N. Y.

FOOTE

MULTI FOOTE CONCRETE PAVERS
ADNUN BLACK TOP PAVERS
Kinetic ASPHALT MIXERS

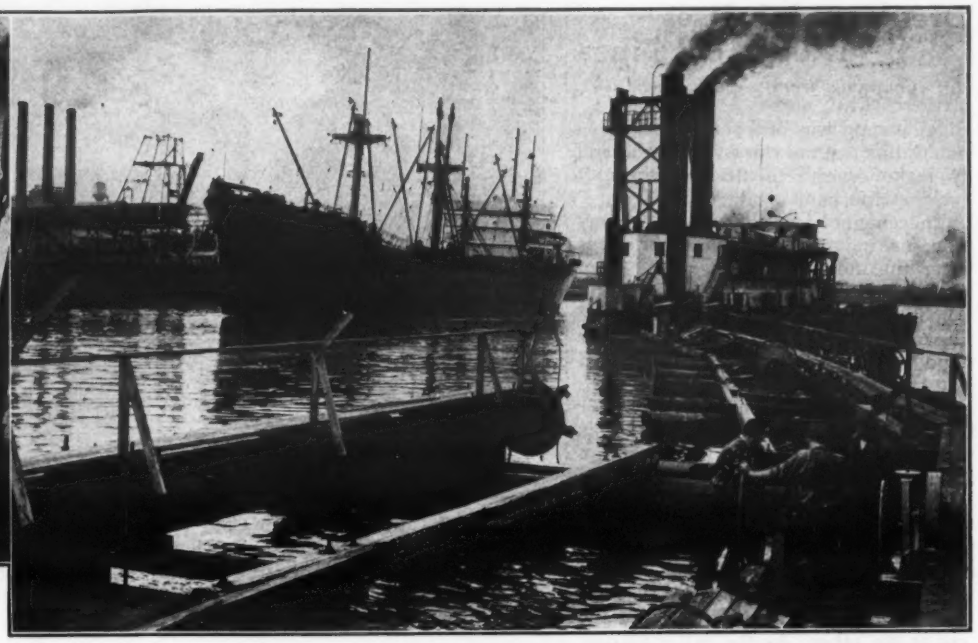
See also page 68

Operators Prefer Yaun



THE PERFECT BALANCE OF A *YAUN* CUTS DOWN ON OPERATOR FATIGUE. ASK ANY OPERATOR WHO HAS USED A *YAUN*. HE'LL TELL YOU THEIR PERFECT BALANCE AND ALL-WELDED CONSTRUCTION WILL OUTWORK OTHER BUCKETS. ASK YOUR DEALER FOR THE LATEST *YAUN* LITERATURE, OR WRITE DIRECT.

YAUN DRAGLINE BUCKETS AND MFG. PLANT
BATON ROUGE, LA.



C. & E. M. Photos

The floating pipe line of the AG&P's dredge Catt stretches out to a shore connection (above). At right, the Catt moves over in the clear as a gulf steamer comes down the Houston Ship Channel.

can be rotated very easily by a crowbar with no pressure on the line.

Each floating section rested on 50-inch x 31-foot cylindrical pig-nosed pontoons, braced on the outside ends by two 12 x 12 timber strongbacks. Dredgemen on the Gulf Coast have to watch for high winds and rough seas, and this type of solid construction gives them a pipe line that will stand up under most dredging conditions.

AG&P also uses a two-drum winch, mounted on a small barge, for opening the floating pipe line where ship traffic is heavy. This barge is made fast to the pipe line near the shore connection where the line break is to be made. When a ship approaches, the line is broken quickly by the removal of a single bolt and the slight rotation of the keeper ring of the ball joint located at this point. Then, by means of an anchor line run to the far channel edge, the pontoon line is pulled clear of the channel. After the ship passes, a second line pulls the line back together again. The winch operator and his helper attain great skill, making up the connection while the wash from the ship is still rocking the pontoons. Line breaks are thus made in a few minutes.

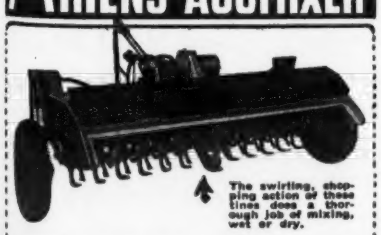
Most of the Houston Channel, however, is too narrow to permit seagoing ships to pass a dredge in mid-channel. It was a general practice when a ship blew her passing whistle to swing over towards the shore on which material was being deposited, and to lower the cutter into the mud. The operator then picked up a tree, a chimney, or any natural range a long distance ahead.

A tug nosed in to the stern, and the operator raised his digging spud. The dredge was pushed in close to the bank, and the spud lowered until the vessel passed by. Then the dredge stern was towed back until the operator could again line his gantry frame with his temporary reference range, and the

(*Continued on next page*)

FOR SECONDARY ROAD CONSTRUCTION...

ARIENS AGGMIXER

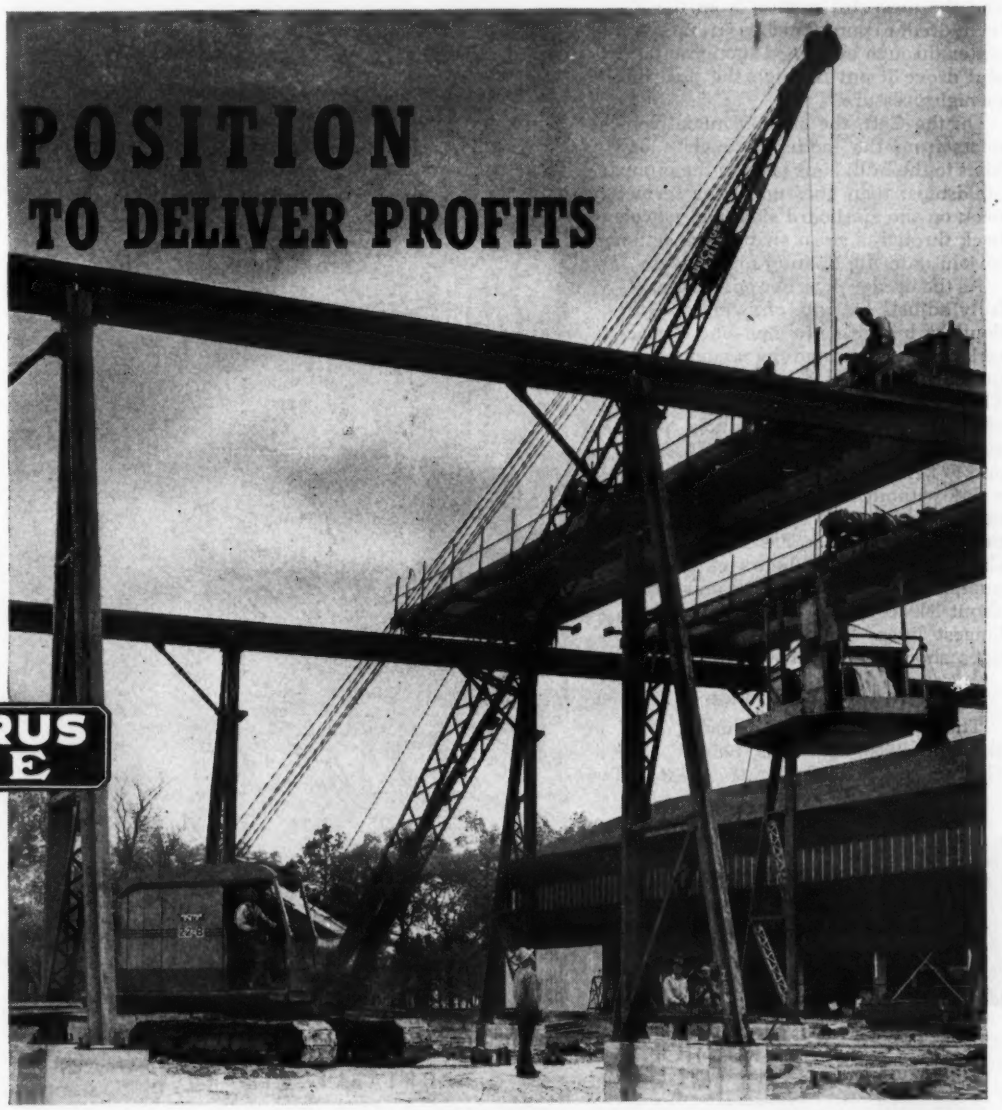


The swirling, chopping action of these tines does a thorough job of mixing, wet or dry.

HERE'S equipment designed especially for mixed-in-place construction—to operate in connection with other general purpose equipment. Whatever aggregates are used it thoroughly pulverizes, mixes and aerates aggregates with binder—rapidly and economically. Also ideal for soil cement stabilization. Safe ... made 4 standard sizes, 4', 5', 6' and 7'. Write for details.

ARIENS COMPANY BRILLION WISCONSIN

In POSITION TO DELIVER PROFITS



BUCYRUS ERIE

HIGH LIFTING capacity per pound of weight, and ability to inch loads accurately into place are two big reasons for the outstanding lifting crane service provided by the Bucyrus-Erie ⅜- to 2½-cu. yd. machines.

An independent boom hoist enables the operator to change the boom angle at any point in the cycle and makes possible the delicate positioning of loads that means efficient, economical crane operation. Positive controls make raising and lowering of the boom safe, sure and simple. Unusual balance and stability combined with easy, certain control of swing, hoist and propel increase working speed to produce the fast, effective crane service you need.

Top-flight crane performance is only one of the many features which put the Bucyrus-Erie ⅜- to 2½-cu. yd. line out front in the field. See your Bucyrus-Erie distributor for more information on these outstanding machines.

BUCYRUS-ERIE CO.
SOUTH MILWAUKEE, WISCONSIN

Dredging Job Uses 17,000-Foot Lines

(*Continued from preceding page*)

digging spud was dropped. The dredge could thus resume work without having to make several inefficient swings to pick up the bank again.

The channel was dug in one operation, making a set ahead with her spuds after the mud from one set had been removed. The Catt made two and sometimes three passes to pick up all the material. The Texas, with a shorter pipe line and more suction, handled the operation in two passes.

Navy-type 3-ton anchors on either side of the dredge near the canal banks were moved ahead by a tug and a derrick scow. These anchors held the 1⅛-inch swing cables, 550 feet long each, which extended to the swing engine drums aboard the dredge. With the stern end pinned down by one of her 65-foot steel spuds, these lines moved the cutter from one side of the cut to the other. As the cutter turned, its blades ripped the material loose, and the powerful suction from the 27-inch dredge pump picked it up with water through a 32-inch suction intake, and drove it out through the pipe line at high pressure.

On the Catt, the suction intake connects from the ladder through a ball joint to the hull; runs back to the pump, amidships; then goes up to the service deck on the starboard side, and travels back through a stern swivel connection to join onto the floating pipe line.

As the dredge digs, her operator carefully adjusts his rate of swing and the depth of his cutter to pipe-line characteristics as indicated by vacuum and pressure gages on a board before him. The idea in perfect dredging is to carry all the muck the line will hold, pump as little water as possible in so doing, and to keep the pump running 24 hours a day without a let-up. This condition has never been attained, of course, so performance figures are relative. The Catt averaged 17½ hours of effective pumping time out of the 24, and moved about 800 cubic yards an hour on her longest lines. This figure rose as the lines shortened to 11,000 feet.

Catt Is Old Dredge

The Catt is a veteran of many a job. Built in 1905, she was named after George W. Catt, founder of AG&P and husband of Carrie Chapman Catt, famous champion of woman suffrage in the early part of this century. The dredge, in her time, dug the Freeport diversion channel at the Brazos River, and she was responsible more than any other dredge for shortening the Mississippi River by 100 miles, by dredging many of the cut-offs on that stream. It is perhaps fitting that AG&P is now considering her for a job at Memphis, back in the locale of many of her earlier triumphs.

C. & E. M. Photo
Left to right are Chief Engineer of the Catt, W. L. Stanton; AG&P General Manager R. R. Manett; Dredge Captain Dunlap Hurst; and Deck Captain Emory Brown.

Her captain, Dunlap Hurst, is himself a veteran dredgeboatman. A tall, slender, soft-spoken Mississippian, Captain Hurst has been at the business since 1932. He rose through the ranks and did many of the jobs his men now do, including inspection, office management, and dredge layout work.

The main power plant aboard the Catt is a set of two Heine water-tube steam boilers, each of which will deliver 38,000 pounds of steam an hour at 225 pounds of pressure. The boilers each have four burner jets, controlled by the Weeks Merit automatic fuel-control system. Four 10-hp electric motors operate the blower fans for the forced draft in her stacks.

The two big boilers are hungry things, consuming from 270 to 290 barrels of Bunker C heavy fuel in 24 hours. This fuel was towed in by barge, and pumped into the 400-barrel storage

(*Continued on next page*)

HODGMAN *Protection*
INSURES CONSTRUCTION

● No. 3062 Waders — Sturdy, comfortable waders for construction workers and all who work in wet, muddy places. Made of strong jersey type fabric coated with a natural rubber compound. Seams, crotch and inseam fully reinforced. Sturdy black rubber boots with cleated sole and molded heel. Suspender straps equipped with buckles.

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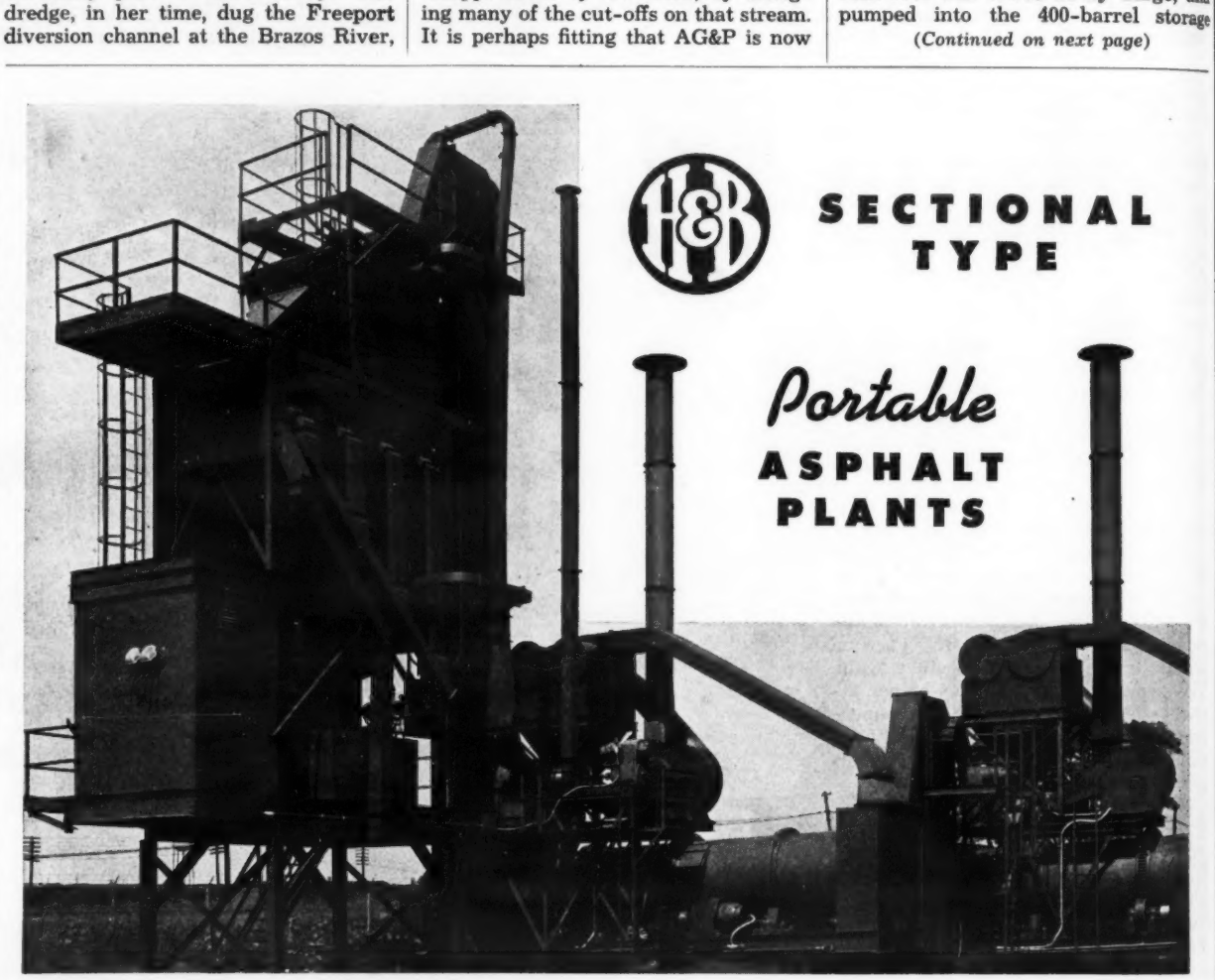
Hodgman Rubber Co.
FRAMINGHAM, MASS.



H&B SECTIONAL TYPE

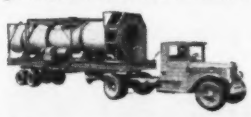
Portable
ASPHALT PLANTS

FOR DEPENDABLE, ECONOMICAL AND UNIFORM PRODUCTION

PA PLANTS ARE EASILY PORTABLE BY TRUCK

All-electric mixer and weighing unit, with control house, mounted on tandem axle.

Diesel-electric-driven mixer and weighing unit with Diesel generator set mounted on main frame.



Same axle may be used to haul dryer unit as is used to carry mixer unit.

● First to build the sectional type asphalt plant, Hetherington & Berner Inc., has always striven to build machinery which would give uniformly dependable production over a period of years. The record of H & B plants under all kinds of operating conditions is the best answer to how well we have succeeded.

H & B sectional type plants are built in two general models: Model PE electrically-driven plants, recommended primarily for contractors who do not ordinarily move more than once or twice a season; Model PA plants, designed primarily for the contractor who moves frequently and who must be able to get efficient production on small as well as large jobs, and under a wide variety of operating conditions.

Bulletin P-46, describing both PE and PA plants, will be sent on request.

HETHERINGTON & BERNER INC.
731 KENTUCKY AVENUE • INDIANAPOLIS 7, INDIANA

tanks aboard the dredge.

Maintenance Engineering Corp., of Houston, furnished all chemicals for the boiler feed-water treatment, and it made sample analyses and recommendations each month. Where boiler washing and scaling used to be a hard, messy, weekly job, it occurred no oftener than 60 to 90 days on this job. Boiler feed water is somewhat high in alkalinity around Houston, so the dredge's Chief Engineer, W. L. Stanton, added 5 pounds of Hagan phosphate in solution every 24 hours. This chemical is a glassy-looking substance which dissolves readily in water.

The steam from the boilers is not wasted. It passes from the turbines, after it is used, to a big Elliott condenser. A 16-inch pump driven by an Elliott turbine provides cold-water circulation for the condenser. Here it is cooled, returned to its liquid water state, and sent back under pressure to the hot well at the boiler. An Elliott turbine driving a 4-inch condensate pump does this work.

Steam from the boiler operates all equipment on the dredge, directly or indirectly. Amidships, just astern of her 27-inch custom-built centrifugal pump, is a big 4,000-hp Elliott turbine. Steam drives this turbine at speeds ranging from 3,000 to 3,600 rpm, depending on the load, and the turbine drive shaft connects to the pump runner through a set of reduction gears. The gear-reduction ratio is 11 to 1.

Between the pump and the gear-reduction box is a big Kingsbury thrust bearing, to take the thrust caused by the pump suction. Dredgemen formerly had a great deal of trouble with burned-out bearings at this point before the heavier Kingsbury types were brought out.

A 1,300-hp Elliott turbine also drives three of the main generators which build power for other parts of the dredge. On a single line shaft from this turbine are three Allis-Chalmers generators. One machine generates power for the 450-hp Allis-Chalmers cutter motor; one generates power for the winder motor; and one serves double duty as a light generator and excitation-current supplier.

Auxiliary pumps include two Worthington steam-driven reciprocating fuel-feed pumps; two Davidson reciprocating units which transfer boiler feed water from the hot well to the boiler; and two Lecourtenay service pumps, driven by an Elliott turbine. A Davidson bilge pump is also available to pump out the 200 x 42 x 16-foot steel hull.

The main pump aboard the Catt uses a 95-inch-diameter runner with four vanes, turning at 300 rpm. The rigging-in clearance between the outside of this great runner and the shell of the pump is only 2 15/16 inches. The heavy soft mud on this job was not abrasive, and it did not wear the runner or cutter blades to any great extent.

Her 117-ton 75-foot straight-type steel ladder is supported by her steel forward gantry frame, and can be raised or lowered by a line to the hoist drum. Her 18-ton steel spuds are also raised and lowered by lines to two of the hoist drums.

The cutter in use on this work was a special AG&P design, with six blades. It is about 4½ feet long, 4 feet in diameter at the nose, and 7 feet in diameter at the back. The back of the cutter lines up with the flared suction-pipe intake.

C. & E. M. Photo
The tug Minnie S, with the derrick scow in tow, moves the Catt's starboard swing anchor, on the Houston ship channel job.

Attendant Equipment

Since the dredge is not self-propelled, She has to depend on some auxiliary equipment. The 59-foot tug Irma did most of the heavy towing on this job, powered by a 240-hp Fairbanks-Morse diesel engine. The 120-hp tug Minnie S, 51 feet long, did much of the lighter work, including the moving of anchors.

The 20-ton derrick barge is equipped with a Hercules engine and a two-drum Mundy hoist. The dredge had 19,000 gallons of fresh-water storage aboard, but also used a 70,000-gallon and a 90,000-gallon water barge. Two fuel barges, 3,000 and 5,000-barrel capacity, served the rig. A small repair barge housed spare parts and the "junk" which sometimes accumulated.

Shore Disposal Work

Disposal of the dredged material ashore was one of the important parts of the job. Captain Hurst had 1,300 lengths of lap-welded slip-joint pipe available, in 16-foot lengths. Much of this pipe was brought in ahead of the dredges.

The shore lines were laid from the various shore connections, and "married" into the main line which led to the dump ground. Experienced men can make a pipe marriage look easy, but it is quite difficult. The pipe leg has to

(Concluded on next page)

DECALS

The Long Lasting Economical Nameplate

10 Day Delivery

SEND PENCIL SKETCH AS TO SIZE AND NUMBER OF COLORS FOR PRICES

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220 E. Harry
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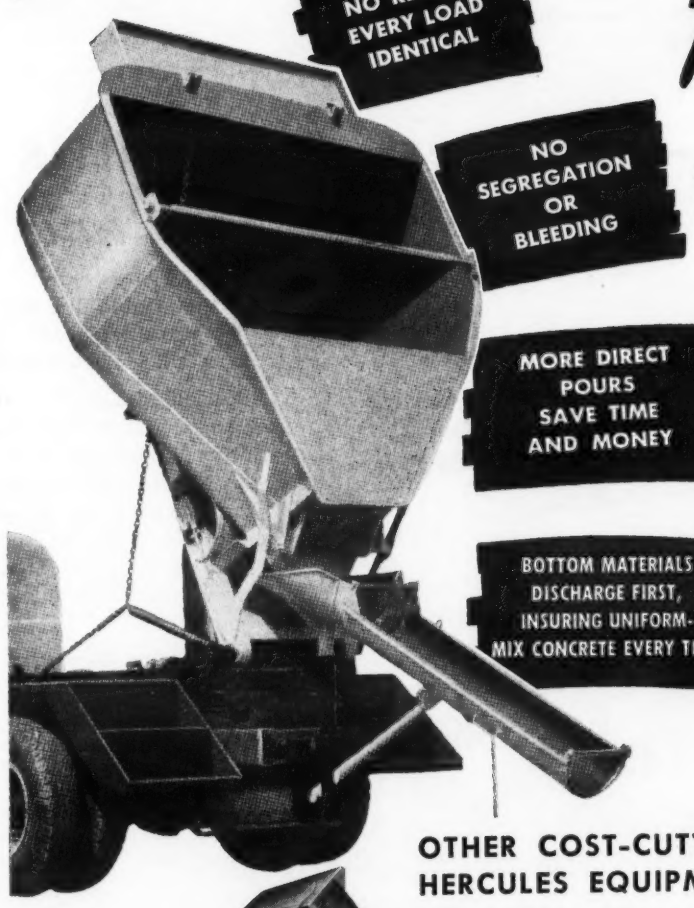
NOW... A Revolutionary New Method of Hauling and Placing AIR-ENTRAINED CONCRETE!


NO REJECTS EVERY LOAD IDENTICAL
NO SEGREGATION OR BLEEDING
MORE DIRECT POURS SAVE TIME AND MONEY
BOTTOM MATERIALS DISCHARGE FIRST, INSURING UNIFORM-MIX CONCRETE EVERY TIME

The Hercules Aircreter

Here's the modern method of delivering and placing air-entrained concrete! With the HERCULES AIRCRETER, every load is identical, rejects are eliminated, because the AIRCRETER delivers premium quality, uniform-mix concrete, exactly as it is produced at the central mixing plant, under absolute control. The lightweight construction of the AIRCRETER also permits more direct pours, cutting time and labor costs on every job.

You'll find more and more of these revolutionary HERCULES AIRCRETERS on the big construction projects, simply because alert contractors can't afford to overlook the benefits—and profits—that the HERCULES AIRCRETER provides. Complete details are available, write today for Bulletin 3-48.

OTHER COST-CUTTING HERCULES EQUIPMENT

Hercules D-12 Contractor's Body, sturdy unit for all-around work. Pyramid-type enclosed steel side braces and full-length rub rails for maximum strength.

Heavy Duty unit, equipped with Hercules Type X Hoist, for installation on straight or drop-frame trailers. Square and round-nosed models.

LIFT WITH EASE— USE Hercules

STEEL PRODUCTS CORPORATION • GALION, OHIO

Dredging Job Uses 17,000-Foot Lines

(*Continued from preceding page*)

be exactly right for length, the main line broken just right, and the two ends joined together properly to make the joint fit tight when the tractor makes the push.

Ordinarily, in adding on joints from the end of a line, a crew of only 7 men with an International TD-9 tractor was all that was required. The pipes were rolled where needed by the tractor blade, and made up by a straight shove with the tractor. A wooden timber across the bulldozer blade protected the ends of the pipe from damage.

The material moved out to the end of the line at velocities up to 18 fps, and dropped as low as 12 fps on the extreme length of line. With the 17,000-foot line, the end of the pipe was barely full of solution.

Spillways made of creosoted timbers, with adjustable waste weirs, drained the water off the far end of the disposal pond and let it run back towards the channel. These spillways were 30 feet wide, 10 feet high, and 28 feet long. They also had 20-foot wooden flumes at the lower end. Water was carefully watched across the weir to make certain all the solids had been dropped in the settling basin.

Dredgeboating has a way of getting in a man's blood. Many of the Catt's crew of 95 men are old-timers at this game. Some live aboard the dredge; nearly all eat their meals in the excellent galley there. Extensive safety regulations by the company and the Corps of Engineers have been coupled with the use of tractors on the dump ground, mechanical improvements, and new ideas like the easy ball joints, to make this modern type of dredgeboating safe, interesting, and satisfying.

The project was under the general supervision of Colonel B. L. Robinson, District Engineer of the Galveston Office of the Corps of Engineers. C. M. Wood was the Resident Engineer under Colonel Robinson.

Data on Diesel Tractors

Catalogs describing two diesel-powered track-type tractors have been prepared by the Caterpillar Tractor Co., Peoria 8, Ill. Catalog No. 10750 discusses the D4 tractor, and Catalog No. 10980, the D6. Both bulletins stress the manufacturing and engineering features of these machines.

No. 10750 discusses the power and gages of the D4, its Caterpillar-built diesel power unit, the fuel system, governor, lubrication system, transmission, driving mechanism, tracks and roller frames, rollers and idlers, and tracks. A 2-page cutaway side view of the D4 illustrates the location and interrelationship of its various parts.

No. 10980 discusses the power rating of the D6, maintenance adjustments of the Caterpillar diesel engine, fuel requirements and consumption, the fuel injector, lubrication system, transmission, frame, Hi-Electro hardened final-drive gear, tracks, hour meter, and typical uses of the D6 tractor. Also covered is the use of the D6 with various tractor attachments.

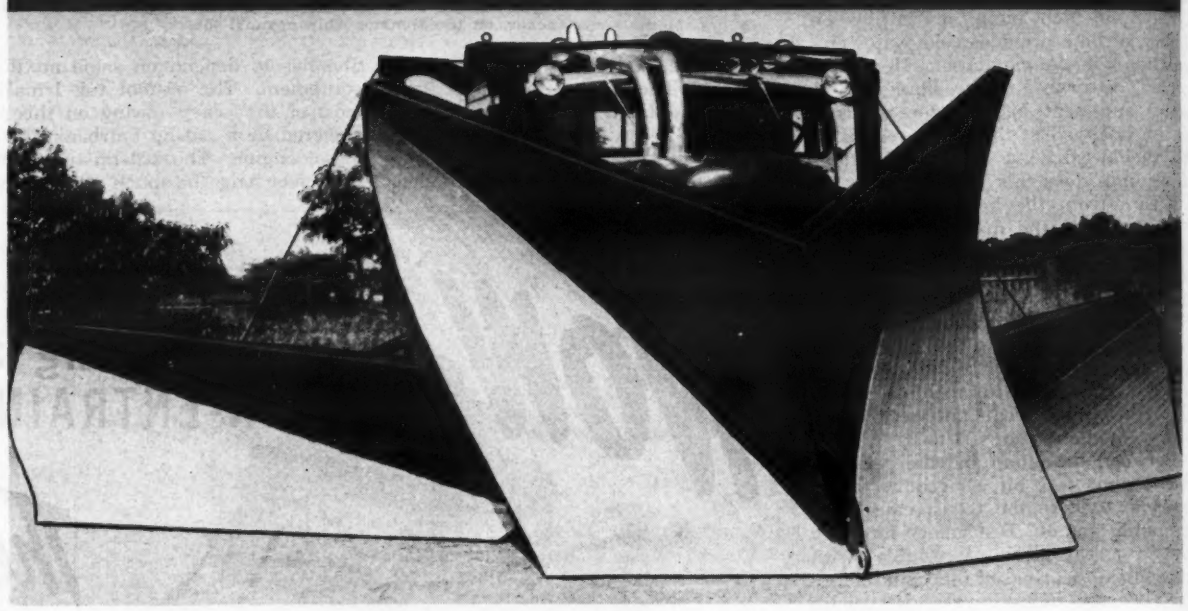
Copies of this literature may be obtained from the company. Or use the enclosed Request Card. For Bulletin 10750, Circle No. 21; for Bulletin 10980, Circle No. 22.

ARBA Technical Bulletins

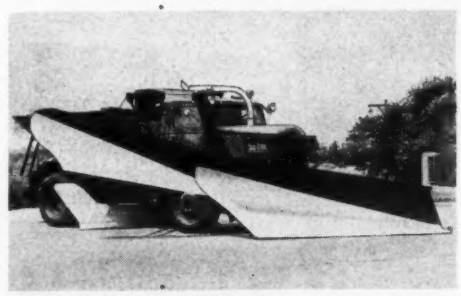
Three technical bulletins have been made available by the American Road Builders' Association. Bulletin No. 133 is the "Report of Committee on Grade Separations—Railway and Highway"; Bulletin No. 138 is the "Report of Committee on Asphalt Emulsion Soil Stabilization"; and Bulletin No. 146 deals with the "Problems of Ground Transport to Growing Air Terminals". The report contained in Bulletin No. 146 was first published by the Eno Foundation for Highway Traffic Control.

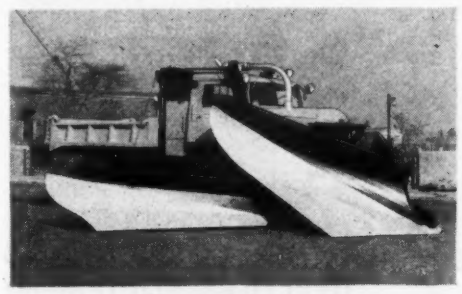
Copies of these bulletins are available by writing to the ARBA at 1319 F St., N. W., Washington 4, D. C.

TRUCK and PLOWS *designed as a* TEAM!



—another reason why WALTER SNOW FIGHTERS *clear snow faster!*





Powerful Walter Snow Fighters permit mounting bigger plows, wings and blades of greater capacity and faster, more efficient clearing action than any other equipment.

Specially designed to take full advantage of the great traction of Walter Snow Fighters, the Walter V front plows, offset V plows and speed plows supply high arc and correct lifting and throwing action to hurl snow far off the road, yet provide proper drivers' vision. Hydraulically controlled side wings fan out snow to give remarkable dispersion. Less snow remains to be re-handled. A greater volume of snow is removed on each run and more miles cleared per hour.

Only Walter Snow Fighters, with the superior traction of the Four-Point Positive Drive, can provide the great pushing power and speed to effectively use these high-capacity plows, as well as the Walter pressure center scraper blade.

See your distributor for full details on Walter Snow Fighters—or write us for literature.

WALTER MOTOR TRUCK CO. 1001-19 Irving Ave. Ridgewood 27, Queens, L. I., N. Y.

WALTER SNOW FIGHTERS

IMPROVED OWENS DIG for IMPROVEMENTS ...EVERYWHERE

Long experience and intensified experimentation has enabled Owen engineers to originate designs, utilize special alloys and develop methods of manufacture that reduce weight, increase strength and provide greater wear resisting qualities.

"Owen Clamshell Buckets Insure a Bigger Day's Work."

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A MOUTHFUL AT EVERY BITE

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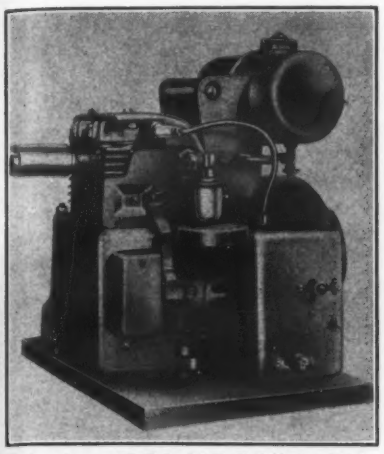
Read the "TRADING POST"

SELLING USED EQUIPMENT?
See pages 106 and 107
Advertise it in the "TRADING POST"



The Onan Model AAE lighting plant, which generates 350 watts of ac, occupies less than 2 cubic feet of space and weighs 77 pounds.

New Lighting Plant

A lightweight gasoline-engine-driven lighting plant is announced by D. W. Onan & Sons, Inc., 43 Royalston Ave., N., Minneapolis 5, Minn. The Model AAE generates 350 watts of ac, occupies less than 2 cubic feet of space, and weighs 77 pounds. The AAE plants are available in both 115-volt ac models and in 6, 12, and 32-volt dc battery-charger models. The battery chargers are available in 300 and 400-watt capacities.

The new Onan electric plants feature electric push-button starting, and they can be hooked up to any automobile battery for starting. While the plant is running, a special 6-volt winding in the generator charges the starting battery. Ratings for the battery chargers are as follows: charger for the 6-volt battery, 40 amps at 7 volts dc; charger for the 12-volt battery, 28.5 amps at 14 volts dc; charger for the 32-volt battery, 11.0 amps at 36 volts dc. Standard equipment for the AAE series includes battery cables, Twistite receptacle for direct plug-in of load, and a high-low toggle switch to regulate the charging rate.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 94.

Contractors' Equipment

The 1948-49 edition of a catalog on equipment for the contractor is available from the Joy Mfg. Co., Oliver Bldg., Pittsburgh, Pa. Listed in the catalog are spaders, rock drills, drill bits, wagon drills, portable and stationary air compressors, paving breakers, backfill tampers, sheeting drivers, trench diggers, drifters, portable hoists, air motors, core drills, rock loaders, safety lighting cable, and air-line anti-freeze.

Each unit in the line is illustrated, and text describes its principal features and advantages. Specifications are listed for each model in the series, and, when there is more than one size of a model, the specifications are tabulated to present an easy-to-read comparison of the various items. Specifications cover capacities, weights, power requirements, and other details of operation and construction.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 101.

Bituminous Distributors

A 32-page catalog of "foto-facts" on the Etnyre line of bituminous distributors has been made available by E. D. Etnyre & Co., Oregon, Ill. It describes the Model FX-400 Black-Topper in four styles, the patented No Drip spray bar, the Shut-Off-At-Nozzle circulating spray bar, the Vacu-Flo cleaning system, the Uni-Flo nozzles, the positive-displacement pump, the available power units, and other Etnyre features.

Each model is illustrated to show principal operating parts and streamlined design. Specifications list weights, capacities, mounting data, etc. The book is full of photographs showing the equipment in use on a variety of distributing operations. Power units, burners, valves, joints, filters, and other component parts also come in for a description in Catalog No. 510. A 2-page list of 60 features and standard equipment is included.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 128.

Dierking Promoted by PCA

R. F. Dierking has been appointed Manager of the West Central Offices of the Portland Cement Association to succeed R. W. Winters, who has resigned. He will make his headquarters in Kansas City, Mo., and will cover the states of Colorado, Kansas, Missouri, Nebraska, Oklahoma, and Wyoming. Fred F. Loy will succeed Mr. Dierking as Iowa District Engineer, with headquarters in Des Moines.

POWER to Give Dirt, Rust, Scale the *Brush-Off!*

Mount a tough, longer-lasting Van Dorn "Whirlwind" Wire Cup Brush on a powerful Van Dorn Portable Electric Sander—for removing rust, dirt, scale, grease, tar and old paint from construction equipment and materials! Drives other attachments for sanding any surface, grinding any metal, shaping and semi-finishing lumber, too. Powerful Van Dorn-built motor. Matched and lapped spiral bevel gears of heat-treated alloy. Complete protective sealing against dust and dirt. See your nearby Van Dorn Distributor for details. Write for free catalog to: The Van Dorn Electric Tool Co., 787 Joppa Road, Towson 4, Md.

For Power Specify "Van Dorn" (DIV. OF BLACK & DECKER MFG. CO.) PORTABLE ELECTRIC TOOLS

"a word to the wise"...

STORM WARNINGS ARE FLYING

Cold and wet weather ahead means *you* will need tarps—and when you need them . . . you want them PRONTO!

Send out your S. O. S. to your dependable Wenzel distributor. He will fill your tarpaulin requirements immediately from his complete stock.

For cold and rain . . . **SPECIFY *Wenzel "Para" Waterproofed Tarpaulins.***

Processed with a genuine parraffin base—Para Tarpaulins contain no oil or clay. They are air-dried . . . never exposed to damaging heat. Para Tarpaulins are completely waterproof, stronger and tougher . . . to give you PLUS-SERVICE.

For added Fire-Protection . . . **SPECIFY *Wenzel Fire and Water Resistant Tarpaulins.***

These new, high-quality Tarpaulins are processed by a new-improved method. Guaranteed to give you longer service and greater protection against fire-loss.

Full breaking strength—quaranteed new . . . not Government Surplus. Duck woven . . . treated . . . after Sept. 1, 1948. No risk of fabric weakening due to long storage and prolonged chemical action.

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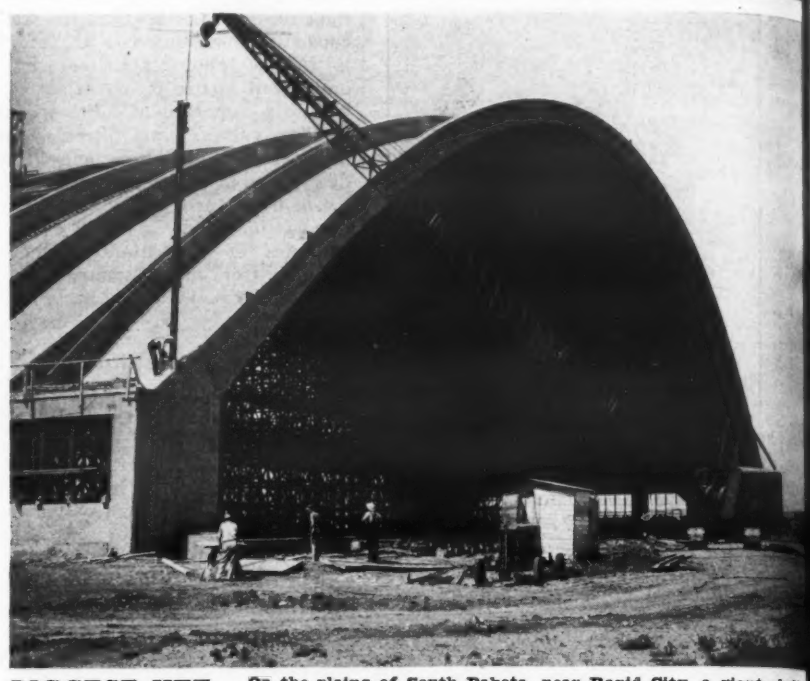
Biggest Bomber Hangar

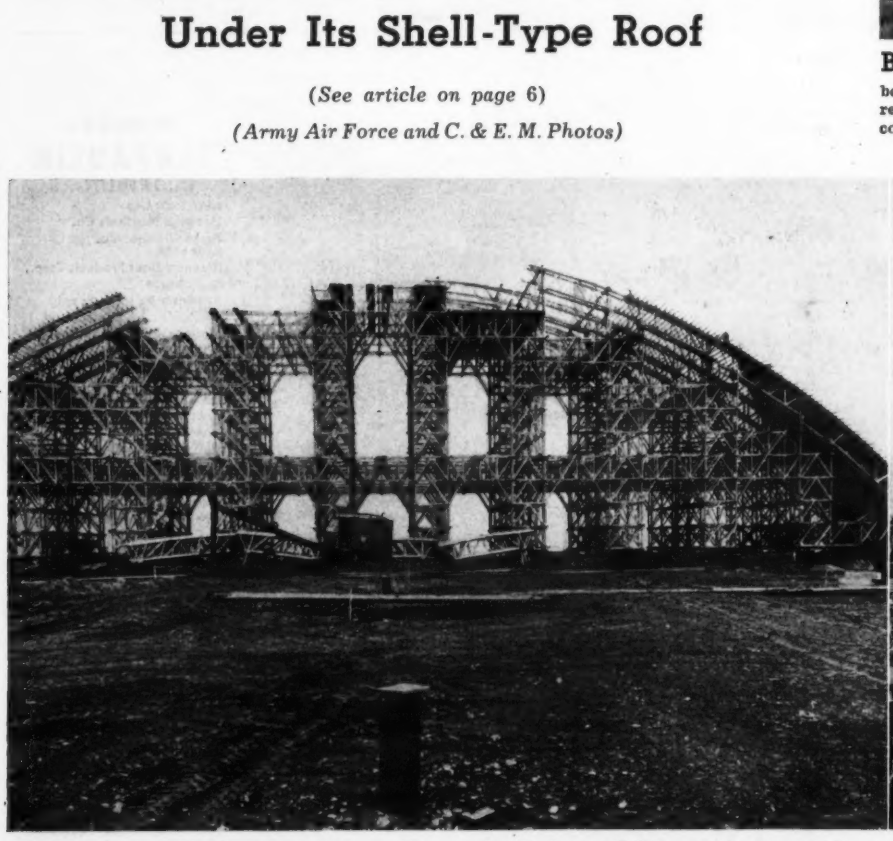
Reinforced-Concrete Structure For Heavy-Bomber Repair Provides 340-Foot Clear Span Under Its Shell-Type Roof

(See article on page 6)

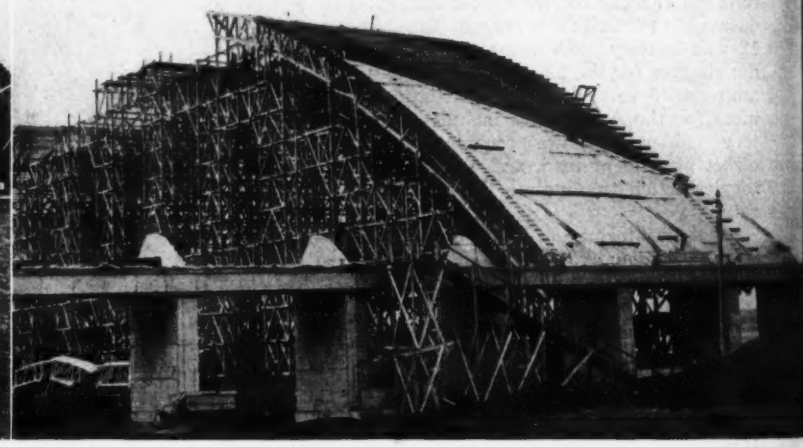
(Army Air Force and C. & E. M. Photos)



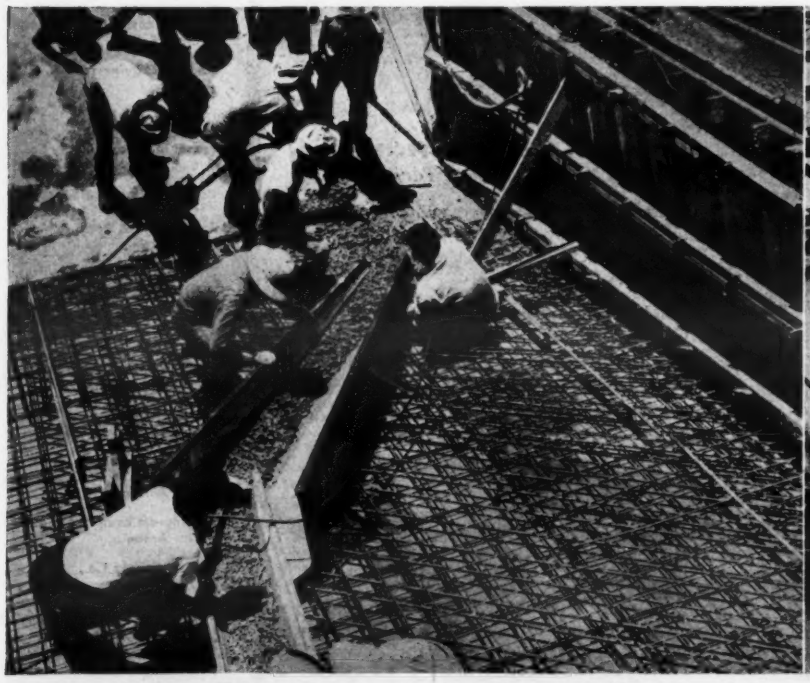
BIGGEST YET On the plains of South Dakota, near Rapid City, a giant shelter for modern planes is taking shape. Six B-29's or two B-36's will be able to enter its 300-foot clear door opening and rest together on its 102,000-square-foot reinforced-concrete floor, under the 340-foot clear span of its Z-D shell-type reinforced-concrete roof. Not hard to believe, is it, when this Manitowoc Speedcrane, about to set structural steel for doors, looks dwarfed in the huge opening?



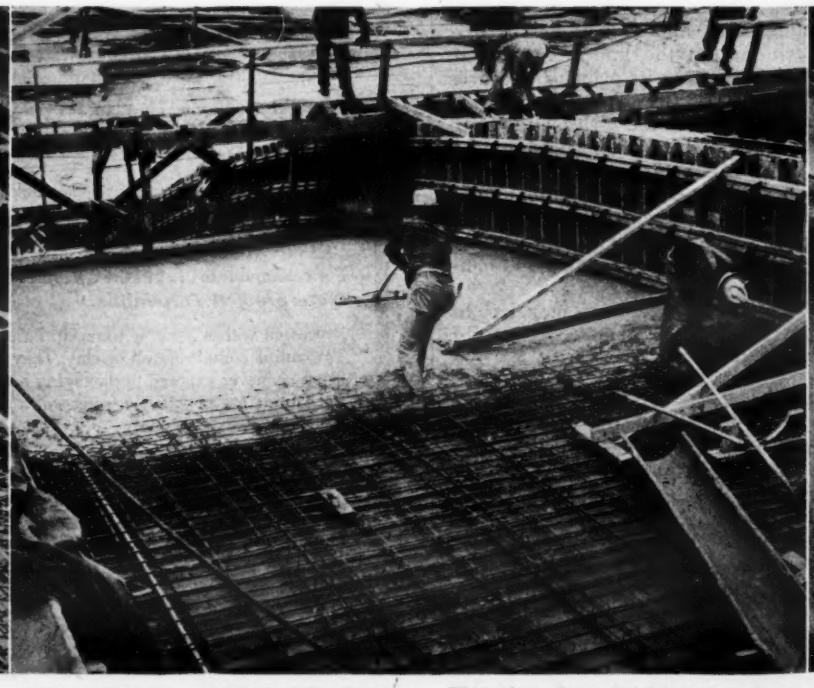
SUPPORT SCAFFOLDING The massive timber scaffolding which supports form work during the roof pours consists basically of curved trusses resting on 12 sets of upright piers. Each pier carries a Simplex 25-ton screw jack which permits the trusswork to be raised and lowered independently of the upright framework. The 12 piers rest on big ground pads to exact grade during a pour, but ride along on steel wheels and a single railroad rail during the move ahead.



SCAFFOLD ERECTION The support scaffolding was assembled during the winter months at a total assembled cost to Steenberg of $150,000. Starting at the ground, the uprights and bracing progressed to each of their various top elevations. Trusswork sections were assembled on the ground and hoisted by block and gin pole to their positions on top of the uprights. The roof form work is covered with Masonite to insure a smooth concrete surface on the hangar ceiling.

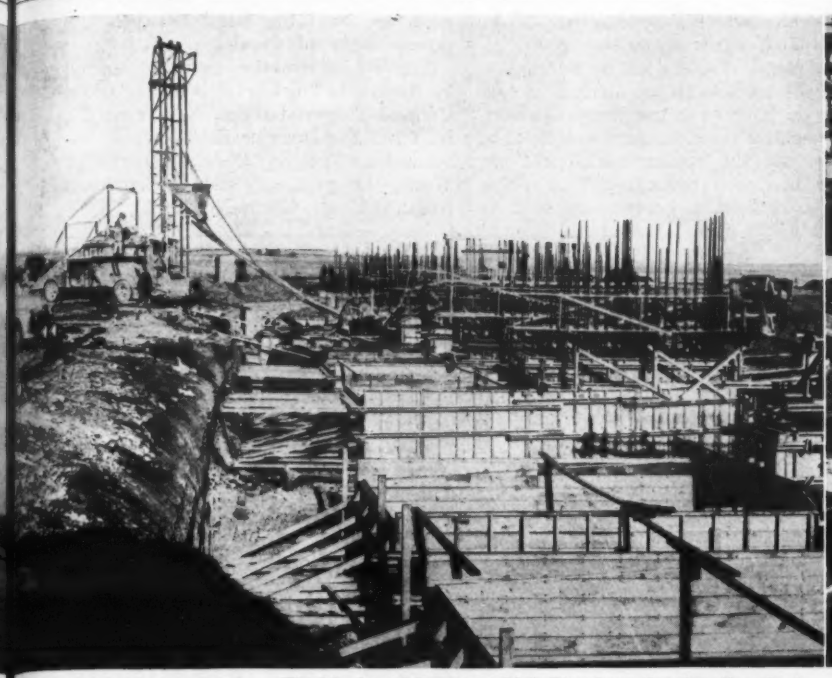


ROOF POUR Half the total concrete crew works on each side of the roof, from the bottom towards the top, as a pour progresses. The concrete is poured in 5-foot lifts on cool days, and in 3-foot lifts on hot days in order to maintain a fresh monolithic joint at all times.

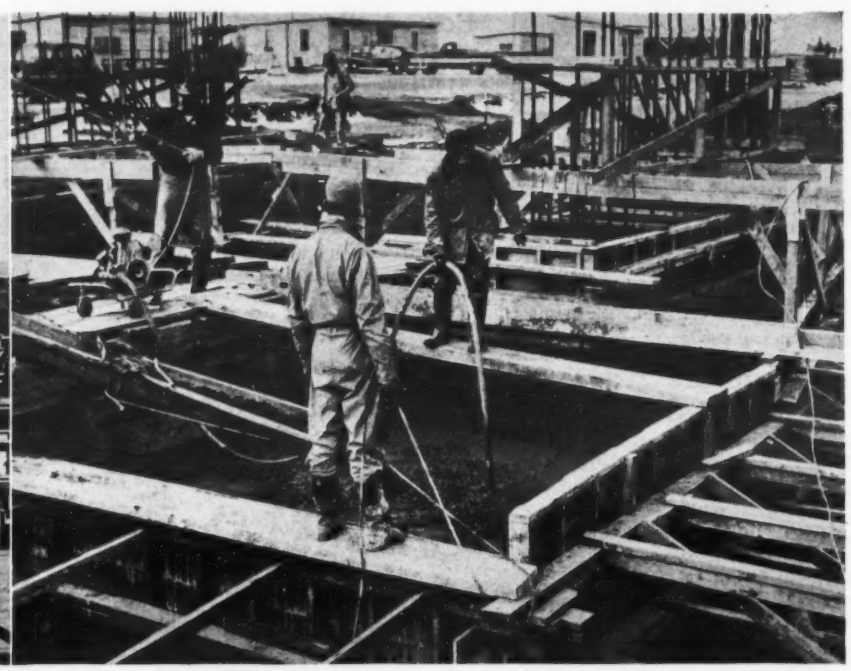


FINISHING, FIRST SECTION This view shows finishers at work on the first of the six roof sections that were placed. This first pour required 42 hours, but when the third section was poured, the crews had reduced their time to 26 hours.

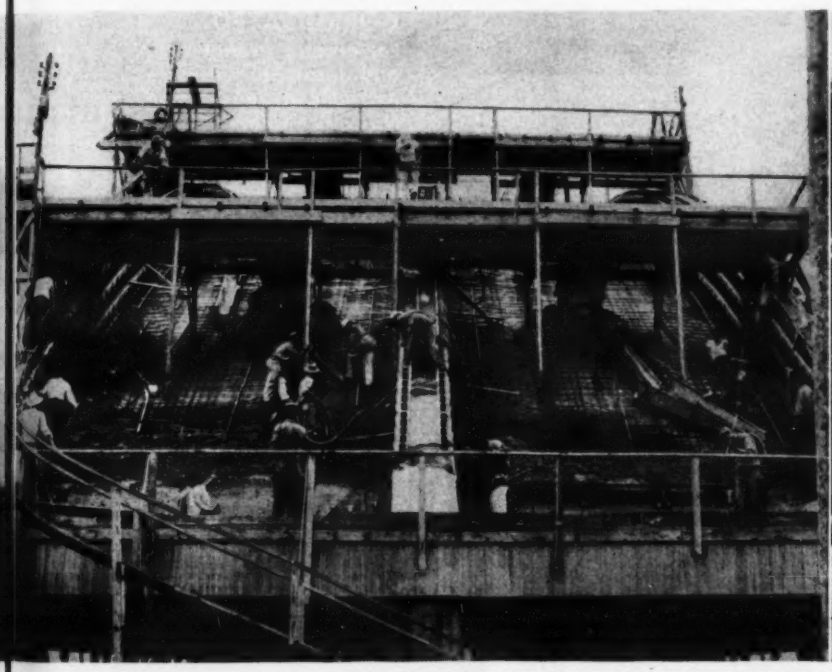
FINISHING,



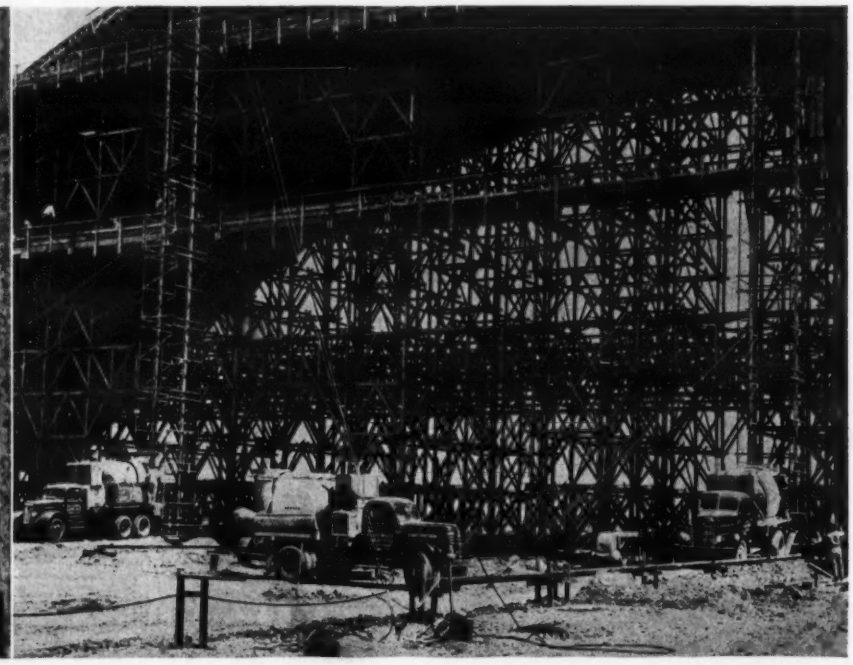
FOOTING FORMS The big domed hangar, which Steenberg Construction Co. is building for the Omaha District Office of the Corps of Engineers, is founded on concrete footings, shown here in the form-work stage. Their load, in turn, is borne by some 616 Raymond concrete bearing piles. And at regular intervals from footing to footing are 13 sets of tension ties to take the horizontal thrust—each set containing six 2½-inch steel rods pre-stressed to a tension of 48½ tons a rod.



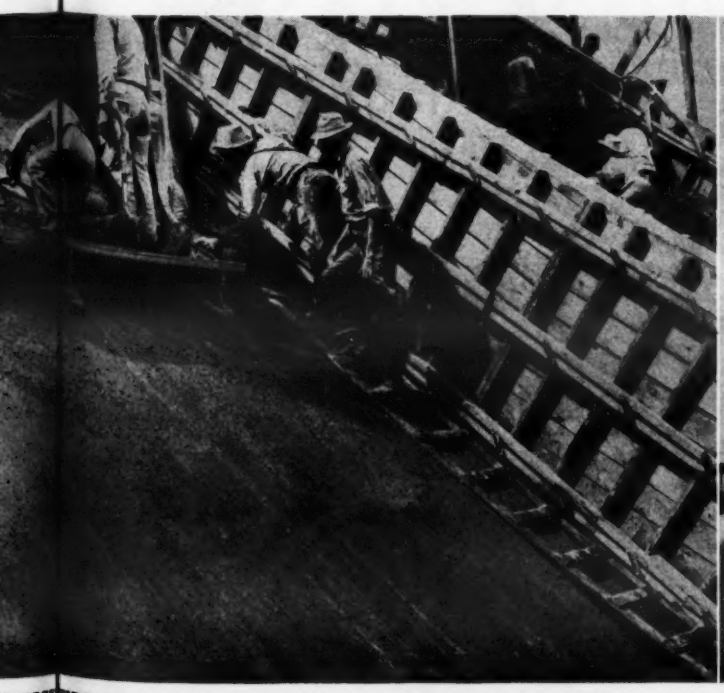
FOOTING POUR For footing pours—and, indeed, for the whole superstructure of the hangar—air-entrained concrete with a design strength of 3,500 pounds at 28 days is being used. It is expected to have a modulus of elasticity of about 3,000,000 psi after 28 days, and is being furnished and placed by Rapid City Concrete Contractors, Inc., of Denver. A Mixermobile (shown in the background of the previous photo) handled most of the concrete that went into the footings.



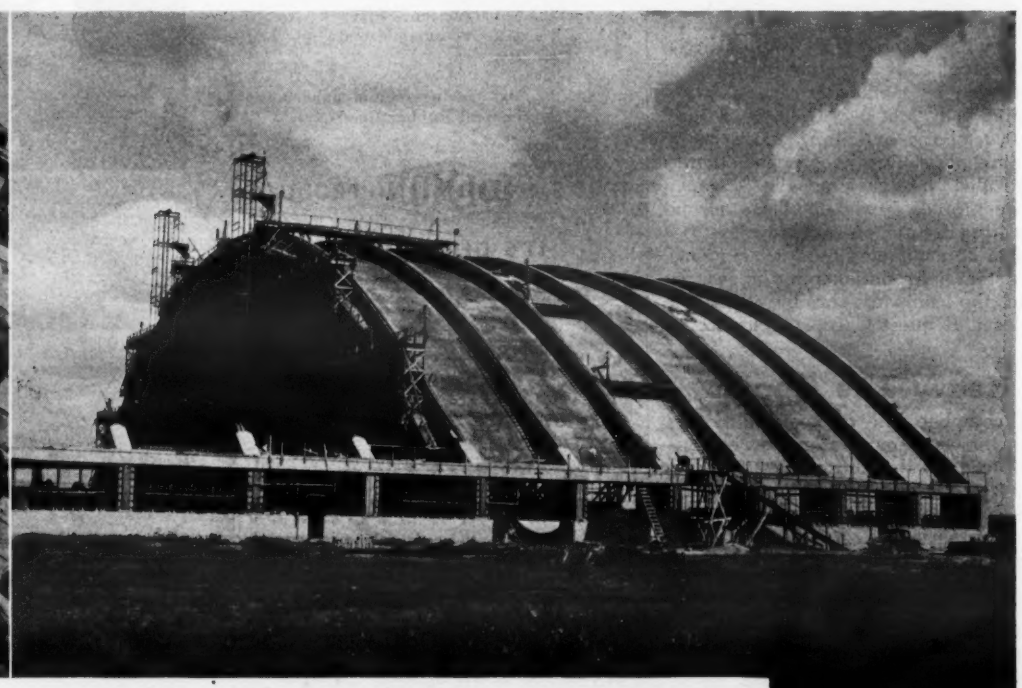
POUR PREPARATIONS When the scaffold has been moved ahead and the form is in place for a roof pour, the Masonite covering is cleaned and oiled. A mat of 6 x 6-inch square mesh is then installed ¾ inch from the floor. Steel bar reinforcement and embedded metal items follow, then a second layer of mesh, placed within ¾ inch of the top of concrete. The pour is on—as concrete, dumped from buggies, begins to flow down the 10-foot-long chutes.



CONCRETE HANDLING Meanwhile, on the ground below, Rex and Smith truck-mixers unload 5-yard concrete batches to Western Machinery Co. buckets installed in two hoisting towers, each 110 feet high and each about 25 feet from the center line of the hangar. Cross bridges one-third and two-thirds of the way up permit concrete to be dumped to Construction Machinery Co. buggies and wheeled to the corresponding access platforms on each side of the roof to start the pour.



NG, SECOND SECTION Here finishers work on the second roof placement. Viber and ...tors are used to consolidate the concrete and it is cured with Sealtex ... Some 15,000 cubic yards of concrete will go into the big hangar.



COMPLETION IN SIGHT Finally, here's an overall view of the hangar at Rapid City Air Base, with three roof pours completed and three still under way. The giant structure should be ready for its giant occupants by March, 1949, at a cost of $1,665,000.

Along with this 1½-cubic-yard dump tractor, W. F. Hebard & Co. has also added a stake-platform tractor to its line of material-handling equipment. Shop Mules, the units are called.

Shop Tractors Have Dump or Stake Body

Two new Shop Mules are announced by W. F. Hebard & Co., 336 W. 37th St., Chicago 9, Ill. These are the Model J233-PLD 1½-cubic-yard-capacity dump tractor, and the Model J233-PLS stake-platform tractor. Both are powered by International Harvester Model GRD233 heavy-duty 6-cylinder gasoline engines. Their draw-bar effort is rated at 3,000 pounds or a towing capacity of 60 tons on dry level concrete. They are designed, in addition to their primary purposes, for use with snow plows, rotary sweeper brooms, and similar attachments.

The Shop Mule dump tractor has a length of 154 inches, a width of 64 inches, a height of 65 inches, a height of dump body from ground of 60 ⅜ inches, a turning radius of 166 inches, and an approximate weight of 5,580 pounds. The Model J233-PLS stake tractor has a platform which measures 64 x 51 inches, a length of 141 inches, a width of 64 inches, a height of 65 inches, a turning radius of 166 inches, and an approximate weight of 4,250 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 67.

Subsurface Surveys By Four-Point Method

A device for geophysical prospecting by means of the four-point method is announced by Associated Research, Inc., 231 S. Green St., Chicago 7, Ill. The Vibroground is recommended by the company for use in determining the subsurface structure for projects such as dams and tunnels, or for investigations in highway engineering. It can also be used, the manufacturer states, for locating clay, sand, gravel, and other building materials, and for determining the water-table level or the depth to bedrock.

The Vibroground Model 258 has a dial-type potentiometer with a 13-inch scale. The bridge-type circuit using a D'Arsonval galvanometer provides a null balancing method. It has four overlapping ranges of 0-3, 0-30, 0-300, and 0-3,000 ohms; and four extra-heavy binding posts. Depth of penetration is controlled by varying the distance between prods. Model 258 has a normal operating frequency of 92 cycles. It is said to be unaffected by stray currents.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 40.

Heavy Tire Chains

A complete line of heavy-duty tire chains in truck or tractor sizes is manufactured by the United States Chain Co., 2242 Lumber St., Chicago 16, Ill. The chains come in standard sizes varying from 9.00 x 16 to 14.00 x 24. Special sizes can be furnished on order. According to the manufacturer, the 14.00 x 24-size chain has a weight of 190 pounds; weights of other chains are proportional. The links are heat-treated to provide maximum wear resistance.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 88.

Faced Plywood Forms Leave No Grain Mark

Plywood for forms prepared with a facing of resin-impregnated fiber material are available for architectural-concrete construction jobs. These overlaid Douglas fir plywood panels for concrete forms are said to possess a hard, smooth surface, resistant to wear and moisture. They can be used over and over again, users report, and they produce a high-type finish on the concrete—a surface which is grain-free and in which checking is eliminated.

The facing is prepared by bonding a sheet of resin-impregnated fiber or paper on the face of the plywood panel. The backing material serves only as a carrier for the resins, which are set under heat and pressure. The resins used are phenolic compounds said to form an insoluble bond between the layers of the plywood.

Further information may be secured by writing to The Carl Besch Co., Grand Central Terminal Bldg., New York 17, N. Y., or the Douglas Fir Plywood Association, Tacoma Bldg., Tacoma 2, Wash. Or you may use the enclosed Request Card. Circle No. 19.

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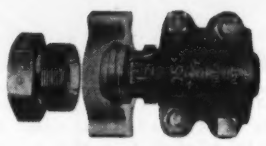

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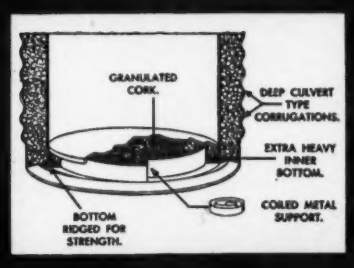

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Hot-Mix Surfaces 23-Year-Old Road

Continuous-Mix Plant Delivers Hot Asphaltic Concrete for Widening And Upper Deck on U. S. 40

✦ DOGGED by rain and wet ground, Midwest Precote Co., Inc., of Kansas City, Mo., recently fought a winning battle to widen and resurface about 12½ miles of U. S. 40 near High Hill, Mo., about 60 miles west of St. Louis. Started April 26, the $220,000 job was done with state funds for the Missouri State Highway Department.

The job was one of several on this highway during 1948. Route 40 was built through this section about 1925, and has generally deteriorated over the years. Concrete patching, asphalt undersealing, and some special crushed-rock blanket work were first done by maintenance forces of the Highway Department. This work was necessary to put the road in shape to take the hot-mix asphaltic-concrete upper decking, and will be detailed later on in this article.

The Midwest Precote job called for a 12-inch widening strip of asphaltic concrete on each side of the old 18-foot slab, a wedge course of hot-mix to level the old pavement, and two courses of asphaltic concrete. The new asphaltic-concrete topping is 2¾ inches thick, compacted. After the Midwest crews finished, it was planned to have maintenance forces re-grade the shoulders and do any necessary grass planting there.

Continuous-Mix Plant on Job

One of the features of the job was the use of a new Barber-Greene Model 848 continuous-mix type of asphalt plant. This plant turned out an accurately mixed batch at peak rates of 120 tons an hour. Crews moved rapidly. One day alone they placed 750 tons of material in the 12-inch widening operation.

The batch plant was set up initially on the Wabash Railroad lines in the town of High Hill. Fine sand from the near-by Missouri River was trucked in, but the other three sizes of aggregate came in on railroad cars. Coarse and fine rock aggregate was shipped from the St. Charles Quarry, and coarse sand came from the Mississippi River deposits operated by St. Louis Material & Supply Co.

These materials were unloaded by a Northwest Model 6 machine with a 55-foot boom and a 1½-cubic-yard clamshell bucket. Four stockpiles were made near the tracks, leaving room for the clamshell to move the length of the asphalt plant. All stockpiles were close enough to the plant so the Northwest machine could reach the bins with any desired material.

Asphaltic cement was shipped in railroad tank cars from Wynnewood, Okla. Most of the cars were too cold to pump when they arrived, so steam lines from the 85-hp plant boiler were attached to the car coils, to bring the bitumen up to pumping temperature. When the asphaltic cement reached a temperature of approximately 300 degrees, a Viking 3-inch asphalt pump unloaded the material to the two horizontal-type asphalt-storage tanks on the job. The capacities of these tanks were 8,000 and 10,000 gallons.

C. & E. M. Photo
An Adnun Black Top Paver lays hot-mix on U. S. 40 through High Hill, Mo.

Neither the storage tanks nor the steam lines were insulated, although this work was high on Midwest's agenda and may have been done by the time you read this article. The asphalt lines were all steam-jacketed.

A Viking 3-inch pump, set near the pugmill, brought asphalt at application temperature from the hot-storage tank, and a smaller 2½-inch Kinney pump on the Barber-Greene plant supplied the material to the hot well on the pugmill.

Other storage tanks on the job included an 8,000-gallon horizontal tank for fuel oil, and 1,000-gallon tanks for gasoline and diesel fuel. Standard Oil Co. of Indiana No. 5 grade heavy fuel oil was used.

Plant Equipment

The Barber-Greene plant consisted of two 25-ton aggregate-storage bins, each divided in two sections; a Barber-Greene cold-rock elevator; a Barber-Greene 7 x 22-foot single drier; a Barber-Greene hot-stone elevator; a Barber-Greene gradation-control unit with 3½ decks of screens; a Barber-

(Continued on next page)

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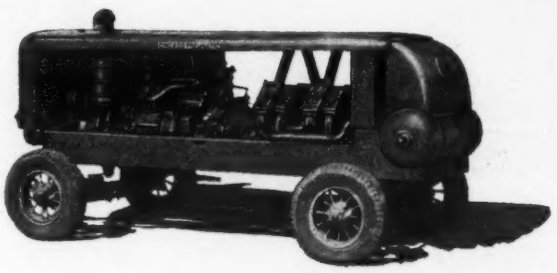
Every item in the wide line of Chicago Pneumatic's construction equipment can be depended upon for efficient and economical performance, because each one has been developed to meet specific requirements.



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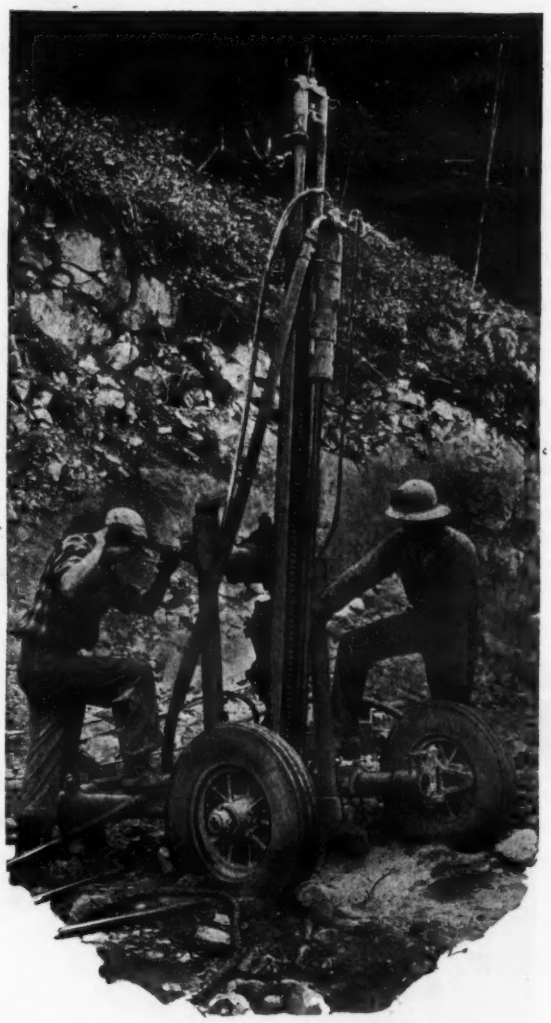

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C. & E. M. Photos

Above is the Barber-Greene asphalt plant which Midwest set up at High Hill, Mo., with stockpiles of sand and rock along the railroad. The close-up at right shows the method of feeding four sizes of aggregate to the cold elevator.

Hot-Mix Resurfaces A 23-Year-Old Road

(*Continued from preceding page*)

Greene continuous-type mixer; and two Clarage size 23 dust-collector fans.

An Oil Well Supply Co. locomotive-type boiler, of 85 hp capacity, was set up. This stationary unit was mounted on skids to make moving easy in case of a change of plant location. Fired with Standard of Indiana No. 5 heavy fuel, atomized through the burners by steam, this boiler heated all asphaltic cement, heated all steam-jacketed asphalt lines, atomized the fuel in the drier burner, operated the steam-driven pumps, and powered a small steam-electric turbo-generator which was used for lights around the place.

A 160-hp General Motors Model 6031-C diesel engine, fitted with a heavy-duty air cleaner, was set up just north of the pugmill. It drove the single-drum drier, the gradation-control screens, hot and cold elevators, the dust-collector fans, and the reciprocating feeders. A second General Motors diesel engine operated the pugmill, the bin feeders, the fine minus-200 feeder, and the hot elevator to the pugmill. This engine, a Model 4031-C, was about 33⅓ per cent smaller than the bigger engine.

A Witte Dieselectric power plant was also used to generate power for a Syntron electric vibrator on the fine-sand bin. The use of a vibrator there made the fine sand feed positively; it also corrected the difficulty of bridging, which had happened in the past.

In this connection also, a bin for handling bulk minus-200 fines was set up, and an enclosed-type feeder installed to the pugmill. The expense of an engine, or motor, on this feeder was saved when the plant foreman made a field extension of the shaft on the gradation-control unit, installed a chain drive, and pulled the feeder off the gradation-control power supply.

The only other auxiliary piece of equipment around the plant was a Wisconsin VE-4 gasoline engine, which drove a 24-inch x 14-foot conveyor feeder from the coarse-rock and coarse-sand bin, and carried the material over to the cold-stone elevator. A Rockford clutch was also used on the engine, to engage its power.

Material Movement

Two sizes of rock aggregates, and two sizes of sand, were stockpiled near the

(*Continued on next page*)

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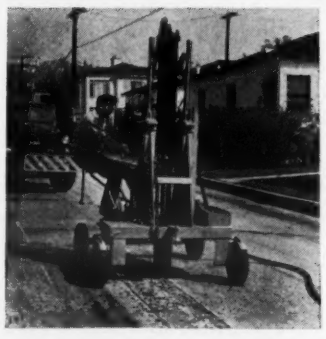

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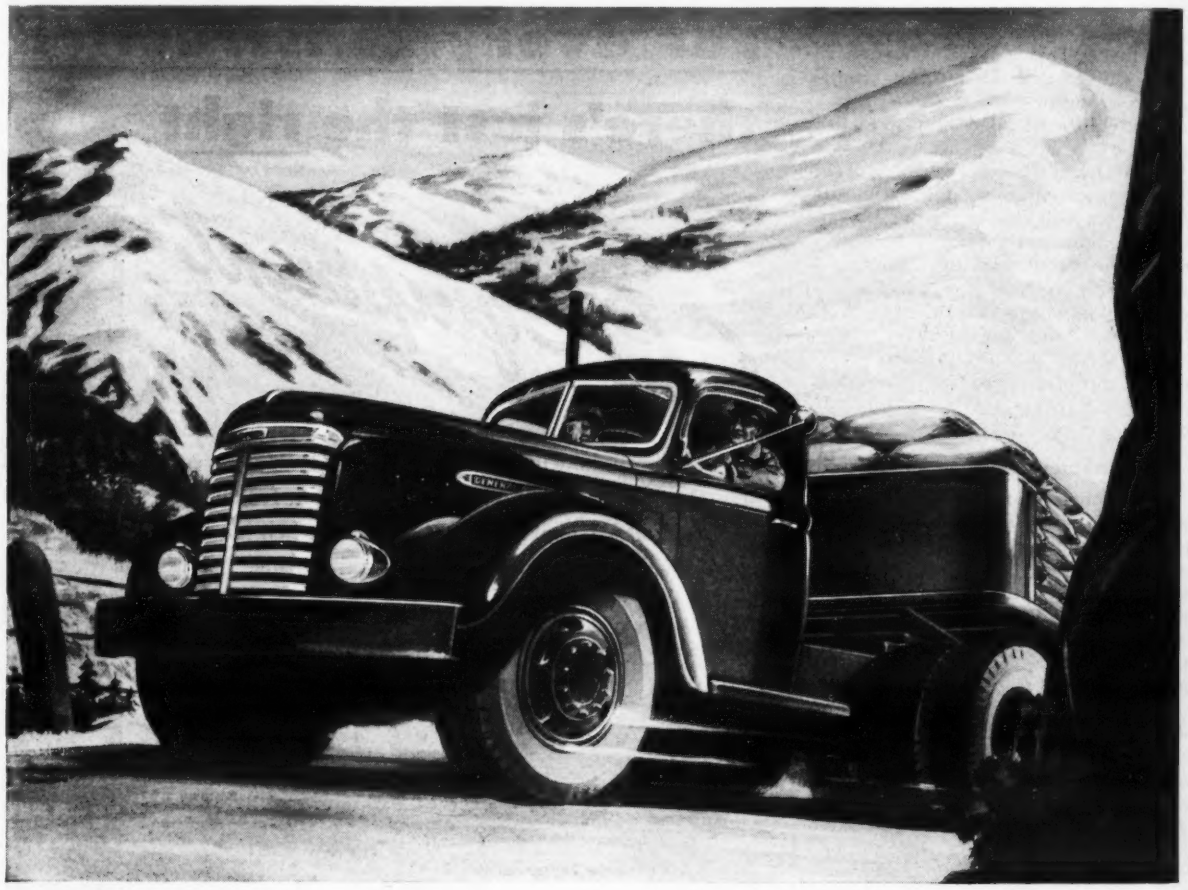

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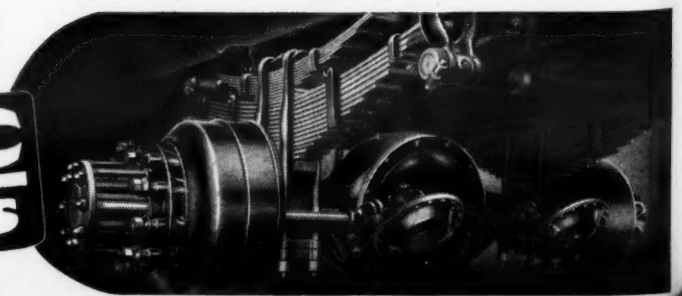


THE TRUCK OF VALUE

GMC TRUCKS

GASOLINE • DIESEL

bins. The Northwest machine then kept the two bins filled with the proper material from each pile.

Fine rock and fine sand were loaded to the 25-ton bin adjacent to the cold elevator. Reciprocating feeders carried the material out, and it dropped directly to the feeder bucket chain of the cold elevator. The Syntron electric vibrator shook a constant flow of the fine sand to the feeder.

Coarse rock and coarse sand came over on the conveyor and also dropped to the buckets of the cold elevator. The blend of aggregates was then carried up to the hopper which fed the 7 x 22-foot single-drum Barber-Greene drier. There the rock was heated to a temperature of about 280 degrees, removing practically all the moisture. The fines which passed off in smoke from the drier were collected near the fans and put back in the mix.

A hot-stone elevator 30 feet high then carried the heated rock up an enclosed chute to the multiple-deck Simplicity vibrating screens on the gradation-control unit. The four 4 x 8-foot decks were screened with 1⅛, 9/16, ⅜, and 1/10-inch square mesh steel screen. These screens separated the hot rock into four sizes, and passed them on to four hot bins above the pugmill. Hot aggregates then fed to the pugmill through another hot-stone elevator, also enclosed.

A pyrometer for checking the aggregate temperature was situated handily near the drier, with its thermocouple in the drier discharge chute.

Asphaltic cement, at a temperature of 280 degrees, moved in a continuous loop to the pugmill mixer. In the Barber-Greene continuous-type mixer on this job, the asphalt was metered in the mix, and good results were attained so far as accuracy was concerned.

The Asphalt Mixes

Two mixes were batched. Type B, used for widening and the first main course, was proportioned as follows:

Size Screen	Size Screen	Per Cent Minimum	Per Cent Maximum
Pass 1-inch	....	100	....
Pass 1-inch	Retain ¾-inch	0	20
Pass ¾-inch	Retain ½-inch	10	40
Pass ½-inch	Retain No. 4	10	40
Pass No. 4	Retain No. 10	5	18
Pass No. 10	Retain No. 40	4	18
Pass No. 40	Retain No. 80	3	20
Pass No. 80	Retain No. 200	2	15
Pass No. 200	....	2	8

Asphaltic cement, 70-85 penetration 3.5 to 6 per cent specified.

A fine-textured Type C mix was also batched, and used for two purposes. It was used in the wedge course to eliminate the layer surface irregularities. Then, after the first main course was placed, it was again used for the surface course. It was batched out according to the following formula:

Size Screen	Size Screen	Per Cent Minimum	Per Cent Maximum
Pass ½-inch	....	100	....
Pass ½-inch	Retain ⅜-inch	0	25
Pass ⅜-inch	Retain No. 4	20	45
Pass No. 4	Retain No. 10	7	20
Pass No. 10	Retain No. 40	7	20
Pass No. 40	Retain No. 80	5	20
Pass No. 80	Retain No. 200	5	18
Pass No. 200	....	4	10

Asphaltic cement, 70-85 penetration 4 to 7 per cent specified.

A continuous supply of the mixed asphaltic concrete poured from the pugmill-mixer discharge gate to waiting trucks. An average of 12 rented trucks, hired by the ton-mile, carried 7-ton loads of asphaltic concrete out to the job. Each load was weighed as it left the plant yard, and the driver was given a weight ticket. These tickets were used as a basis for payment, and by state inspectors as a basis for checking the amount of asphaltic concrete.

Truck beds were oiled with diesel fuel when necessary by the truck drivers.

The continuous-type mix plant had been purchased new in 1947, and this was its second job. Last season a high type of asphaltic-concrete highway was laid near Sarcoxie, Mo., on Route 166 by Midwest Precote Co.

Construction Details

Before any of the material could be laid, a great deal of preparatory work was necessary. State Highway Department maintenance men worked for months, removing sections of broken concrete, installing concrete patches, Mud-Jacking with soil-cement slurries, and asphalt undersealing. The old highway was rough and its joints were pumping mud and water. This preliminary work stabilized the slab and filled in the voids under the old pavement.

To cut the widening trench, an 18-inch steel cutting knife 6 inches deep was bolted to the moldboard of a Caterpillar No. 12 motor grader. This machine then moved along and scooped out a trench 6 inches deep. The dirt removed in this operation was carried off to the side from the motor-grader blade.

With rain an ever-present problem, the ideal way to do this work was to cut open only what could be filled with the first widening course in a day. This was often impossible to do, from a practical standpoint, and several times a mile or two of trench had to be left open overnight.

The job was shut down in its early stages for this reason. For the first few weeks, until the widening work could be done, progress was limited to occasional work days. However, when work was possible, it was done rapidly.

C. & E. M. Photo

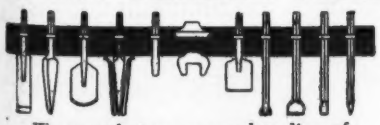
General Superintendent T. H. Cutler, Jr., (left) talks over the 12½-mile resurfacing job on U. S. 40 with Division Construction Engineer G. L. Gray.

The widening material went in in

(*Continued on next page*)

"BICKNELL BETTER BUILT"

PAVING BREAKER TOOLS

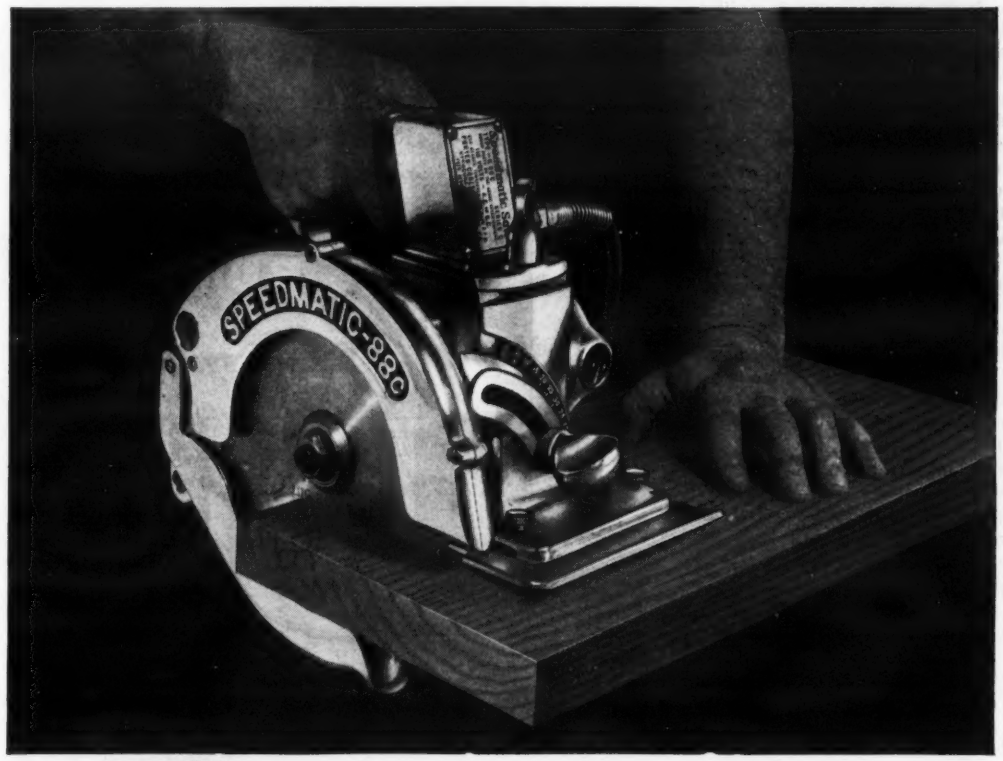


We manufacture a complete line of tools for pneumatic paving breakers, rock drills and diggers.

Write for descriptive circular

BICKNELL MANUFACTURING CO.

12 LIME STREET ROCKLAND, MAINE



ONLY Speedmatic PORTABLE ELECTRIC SAWS

have all these time and effort saving features!

Here is the story . . . and a good one for All builders who are striving for top production

1. **Easier one-hand operation**—The SPEEDMATIC has balanced, light weight. The handle is **on top**—where it should be—instead of behind the center of gravity. You can used it in any position . . . and that means a lot when you have to hold a piece of stock . . . or hold on to a ladder or scaffolding with the other hand.

2. **No tipping, no swerving, no tilting**—And that's real saw performance, requiring no tiresome steadying—and just a light touch for guiding. Reasons: The broad shoe and the center-line power application. (By the way, SPEEDMATIC lies safely on its side when not in use.)

3. **Practically feeds itself**—You don't have to nurse SPEEDMATIC. This saw really has POWER . . . unfaltering power. Blade enters the cut at 7,000 rpm—cutting edge travels faster than two miles a minute. The helical drive delivers 11% more usable power to the cutting blade. The fastest, cleanest, easiest sawing you've ever done!

4. **Does bevel, notches, dados, mitres, tenons, curves, etc.** —Blade raises and lowers for cuts ranging from a scratch to 4⅜" depending on model. Blade also tilts up to 45°. Adaptable to nearly all building materials . . . wood, composition, ceramics and metal.

5. **SPEEDMATIC Radial Arm gives extra utility**—Saw is easily set to any cutting position . . . raised, lowered, swung. Automatic indexing at 45° either to right or left . . . also at 90° for ripping.

The SPEEDMATIC comes in four models.

K-75—7½" blade with max. cut of 2½". Weighs 15 lbs.
K-88C—8" blade with max. cut of 2¾". Weighs 17 lbs.
BK-10—10¼" blade with max. cut of 3¾". Weighs 24 lbs.
BK-12—12" blade with max. cut of 4⅜". Weighs 37 lbs.

Easier to Handle . . . Faster Than 5 Men With Handsaws!

PORTER-CABLE MACHINE CO.

1805-11 N. Salina St. Syracuse 8, N. Y.

TRY A SPEEDMATIC . . . FEEL THE DIFFERENCE . . . THEN COMPARE!

C. & E. M. Photos
A 12-inch widening strip of asphaltic concrete was laid on each side of U. S. 40 in Missouri by the Apsco spreader at left, and compacted by the Apsco roller at right.

Hot-Mix Resurfaces A 25-Year-Old Road

(Continued from preceding page)

two 3-inch lifts. To place this material at high speed, an Apsco spreader was used. With its operator driving a sight line, carrying his steel target even with the pavement edge, this machine moved forward at a speed of a mile an hour, spewing the hot-mix into the trench. Batch trucks dumped their loads to the spreader hopper and were pushed along by the machine.

Initial rolling was then done by a Galion motor grader, the blade of which carried an old 15-inch smooth-wheel steel roller. After this machine gave the material its first rolling, an Apsco steel widening roller compacted the hot-mix to its ultimate density.

The old concrete road was then primed by an Etnyre pressure distributor, which shot 0.06 gallon of RC-0 asphalt per square yard on the concrete. The material was applied half width, at a temperature of about 100 degrees. It was ordinarily laid out ahead of the paving operation about a mile, and left to cure under traffic about 3 days before any hot-mix was put down.

The wedge course was laid by an Adnun No. 744 Black Top Paver. Thickness of the wedge course was variable, of course, and served only to level up the old slab ahead of the main paving.

The two top courses of hot-mix were then laid by a new Barber-Greene Tamping-Leveling Finisher. The lay-down crew on this machine consisted of a foreman, an operator, a screed man, a raker, a shoveler, and two roller men.

The State required Midwest to lap the center joints. The bottom courses were laid 9 feet 6 inches and 10 feet 6 inches wide. Then the topping lifts were laid in 10-foot strips, putting the longitudinal joint over the center line of the highway. The bottom course went down to a compacted thickness of 1½ inches, while the surface course was only 1¼ inches thick.

As the hot-mixed asphaltic concrete

(Concluded on next page)

RUD·O·MATIC
TAGLINE

The Tagline with a sturdy fool-proof
COIL SPRING!

RUD-O-MATIC Taglines are built with a spring tension powerful enough to hold a clam shell bucket steady under the toughest conditions – and with boom at any angle. Compact, easily installed – there are no weights, tracks, pins, or carriages – and fewer sheaves means a definite saving in wear. Eight different models to fit all bucket sizes. See your equipment dealer – or write –

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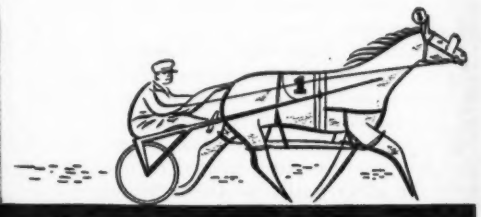
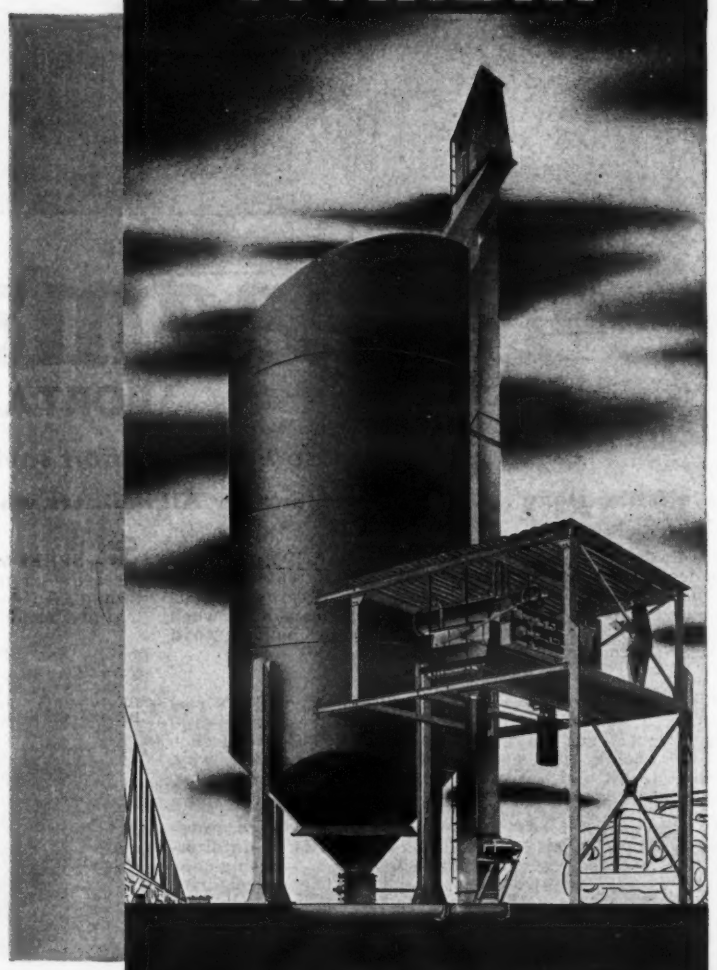
Tagline
Corporation
2131 East 25th St., Los Angeles 11, Calif.

paced to team with a DUAL DRUM paver



the BUTLER *Autobatch* TWINBIN

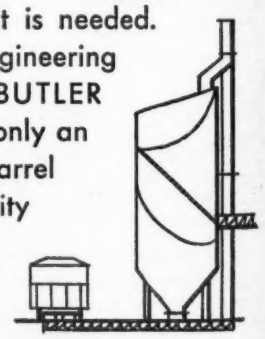


BUTLER BIN CO.
WAUKESHA • WISCONSIN

AMPLE RESERVE CEMENT STORAGE VIRTUALLY ELIMINATES SHUTDOWNS

● Here in the Autobatch Twinbin BUTLER utilizes the space formerly provided for truck loading, — converting it instead to an ample "first floor" *reserve* chamber. The batching platform is pinned to the side of the bin and the weigh batcher is fed by screw conveyor from the "second story" — the active chamber.

When the active chamber is full, an overflow device feeds the reserve below, — a supply which is brought again to the upper compartment as it is needed.



This new engineering advance by BUTLER provides not only an ample 531 barrel cement capacity but with it an actual gain in portability.

The dual *automatic* cement batcher can weigh out two batches of cement in thirty-five seconds for simultaneous discharge, into the batch truck.

Investigate BUTLER'S solution to the cement storage problem brought about by today's high speed batching demands.

Send for the "Twinbin Bulletin".

was laid, big Galion 7 to 10-ton tandem rollers mashed it down to high density. When a longitudinal center joint was being made, the men crowded the laydown machine slightly by lapping it over the line, and the joint was then eliminated further by a single roll close behind the Tamping-Leveling Finisher. The rest of the rolling then held off until the material lost some of its heat. All rolling was longitudinal.

A minimum of 7 days elapsed between placement of the bottom course and the upper. This was done to permit traffic to aid in compaction as much as was practical, and to develop more density. Traffic was carried through the job at all times with the aid of two flagmen, one at each end of the freshly laid asphalt. It was sometimes quite heavy, but was handled efficiently.

Started April 26, 1948, the job was scheduled to be finished in 80 working days. Its completion will help to speed traffic over what has been a rough pavement the past five years, and it will add perhaps 10 to 15 years of usable life to one of Missouri's first concrete highways which otherwise would have been ruined.

Personnel

The job was designed and supervised under the general direction of Carl W. Brown, Chief Engineer of the Missouri State Highway Department, with J. J. Corbett as Engineer of Construction. V. B. Saville is Division Engineer, G. L. Gray is Division Construction Engineer, and Jimmie Glen was Resident Engineer on the project.

For the contractors, T. H. Cutler, Jr., son of one of the Missouri Highway Department's most illustrious Chief Engineers in years past, was General Superintendent. Assisting young Tom Cutler were I. E. Cheves, Plant Foreman, and Lester Summers, Laydown Foreman. F. L. Carswell is President of Midwest Precote Co.

Vibratory Soil Compactor

A self-propelled lightweight soil compactor is described in a bulletin available from the Electric Tamper & Equipment Co. of Ludington, Mich. The bulletin points out that the Jackson electric vibratory soil compactor is for use with all types of granular materials. It also tells how the unit, equipped with specially designed bases, can be used to reduce voidage in coarse gravel or rock, or to place and smooth asphalt and black-top paving mixtures.

The bulletin explains how the Jackson compactor propels itself at speeds of from 5 to 6 fpm, and how it compacts from 10 to 15 square feet of soil per minute to a depth of 12 inches. It describes the Model M-2 power plant used to drive the compactor, and other features of operation and use of this unit.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 76.

FOUNDATION SECURITY

WESTERN'S PROJECTILE PILES have never failed

WESTERN'S Projectile Piles are cast-in-place concrete piles. Where it is necessary to reach a good bearing stratum they are frequently driven to depths in excess of 100 ft. They consist of a steel pipe surmounted by a light metal form both of which are filled with concrete.

Since the steel pipe bearing section is driven through a previously and separately driven casing, friction of the upper strata is eliminated. The final driving needs to move only the lower section, thus indicating the actual bearing value at the point, and allowing all the friction value of the concrete section as an added safety factor.

Sales and Service Building, Cadillac Motor Car Division, Chicago, Ill., rests securely on Western's Projectile Piles.

A steel drive-tube of sufficient length, with close fitting steel core, is driven into the ground. The core is removed and the closed end pipe section is driven out of the tube using the core as a follower. Foreign matter is excluded from the drive-tube by a gasket attached to the upper end of the pipe. When the driving of the pipe has been completed, a corrugated shell is screwed down over the dogs (or anchors). These anchors are welded onto the pipe and develop a strong mechanical bond between the two sections. (See sketch of splice above.)

USE WESTERN'S FREE CONSULTATION SERVICE for fast, expert advice. Discuss your foundation problems with a competent engineer. WESTERN'S engineers speak with authority for they have compiled a long record of successful foundation jobs . . . every type of site, soil, and load condition . . . without one single failure! No job is too big, no job is too tough for WESTERN. *Write for Catalog C.*

FOUNDATIONS FOR INDUSTRIAL PLANTS, POWER PLANTS, STEEL PLANTS, BRIDGES, PIERS and DOCKS, WAREHOUSES, AIRPORTS, HOUSING PROJECTS, SCHOOLS, COMMERCIAL BUILDINGS, ETC.

BUTTON BOTTOM PILES • COMPOSITE PILES • PEDESTAL PILES • CAISSON PILES
PROJECTILE PILES • COMPRESSED CONCRETE PILES • DRILLED-IN CAISSONS
PRE-DESIGN AND PRE-CONSTRUCTION LOAD TESTS • SOIL BORINGS
CORROSION PROTECTION FOR H-BEAM PILES

W

WESTERN FOUNDATION CORPORATION

308 W. Washington St., Chicago 6, Ill. • 2 Park Avenue, New York 16, N. Y.

The new MC 820 Motor-Crane, which dwarfs a modern automobile standing beside it, has a safe-rated lifting capacity on outriggers of 45 tons at a 12-foot radius.

Largest Mobile Crane Has a 45-Ton Capacity

A 45-ton-capacity rubber-tired mobile crane is announced by The Thew Shovel Co., 28th St. and Fulton Road, Lorain, Ohio. According to the manufacturer, this 2-engined Moto-Crane has a safe-rated lifting capacity, on outriggers, of 45 tons at a 12-foot radius.

Component parts of the MC-820 Moto-Crane include the carrier, welded steel frame, telescopic outriggers, and two Waukesha diesel engines. One engine is rated at 225 hp and furnishes power for propulsion of the carrier at speeds of up to 18 mph. It is equipped with an electric starter, generator, air cleaner, muffler, oil filter, and a 12-cubic-foot-capacity air compressor. The other engine is used to power the turntable. A Fuller transmission provides five forward speeds. Grades the unit can climb on a dry concrete road surface are rated from 2.3 to 37 per cent. In reverse, the unit can climb a grade of 29 per cent, the company points out.

The Timken-Detroit rear axles are of double-reduction gear-driven type and are mounted on equalizer beams. The front axle is a dead non-driving axle of the heavy tubular type. It is mounted on heavy-duty springs equipped with helper springs. Manual front wheel steering is aided by a Bendix Westinghouse air-assist steering booster. The rear wheels are equipped with Bendix Westinghouse air brakes of the internal two-shoe type. A parking brake is provided on the propeller shaft.

The center of rotation of the turntable is just ahead of the front rear axle. At full-load speed, the turntable engine is rated at 164 hp. Power from the engine is transmitted through a Twin Disc hydraulic coupling. Power is transmitted from the engine to the mechanism by means of a multiple-strand Diamond roller chain to a center-drive pinion. This pinion, in turn, meshes with the three power shafts of the turntable, hoist, and swing-and-boom derricking—or with the shovel-crowd shaft. Thus, all the engine power may be applied to any one operation or may be spread in proper balance to two or three simultaneous operations.

The standard boom is 50 feet in length, made up of 25-foot bottom and top sections. Center sections of the same design are available in 5, 10, 15, 20, and 25-foot lengths. These may be used to a maximum boom length of 100 feet. The boom is equipped with an all-purpose head which permits handling six parts of line without the need for a top block.

The MC-820 weighs 65 tons, is 66 feet 5 inches in length with the boom in travel position over the front of the carrier, and is 11 feet 7¾ inches in width. It is equipped with a high gantry which, when erected, brings the overall height of the unit to 19 feet 5 inches. Lowering the gantry reduces the overall height of the unit to 14 feet. All wheels are dual and are equipped with 18-ply 13:00 x 24 Rock Grip tires designed for off-the-road service.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 23.

Fiber Welding Shield

A lightweight seamless welding shield is announced by the American Optical Co. of Southbridge, Mass. This hand-held shield is especially recommended by the manufacturer for use where a welding helmet is not practical, for tack-welding operations, and for set-up work. It is made in one piece from a special fiber material.

The AO welding shield has a fiber handle 5½ inches long which is riveted to the body, and an insulated, rivetless glass holder. It is available with standard Noviweld or Filterweld glass plates designed to insure eye protection against welding hazards. The shield, without glass, weighs 11 ounces.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 9.

Hoists and Dump Bodies

A 4-page folder describing its line of hydraulic hoists and dump bodies can be obtained from the Galion Allsteel Body Co. of Galion, Ohio. Items listed are the double-lift-arm Model GH-567A hoist for trucks with standard wheelbases, the 8 to 12-ton-capacity Model GH-57 and GH-58 hoists, the Model GH-577 hoist designed for trucks with long wheelbases, the Model GH-60 hoist for super-heavy duty, and the Galion line of dump bodies from 2 to 25-cubic-yard sizes.

The bulletin tabulates the various hoist models, listing their model number, rating, cylinder size, ground clearance, and mounting height. It illustrates each unit and describes the special features Galion claims for it. Photographs are also used to show five standard body styles and seven special models mounted on trucks.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 12.

Gregson Joins Wellman

Jack R. Gregson is the new District Sales Manager of the Bucket Department of The Wellman Engineering Co. in the Eastern Territory. His headquarters are in the Graybar Bldg., 420 Lexington Ave., New York 20, N. Y. He was formerly Sales Engineer for the Lima Shovel & Crane Division of the Lima Locomotive Works in the Eastern Territory, and Assistant Director of Foreign Operations of the Lima Shovel & Crane Division of the Lima-Hamilton Corp.

NOT THIS-

BUT This!

with Silver STEERING BOOSTER

Fingertip pull on clutch steering levers opens clutches FULL TRAVEL. Ends frequent repairs to clutches, throwout bearings and brakes. Skinners do more and better work because angle-dozing, following contours and steering big crawler tractors does not mean sore muscles and exhaustion at the end of the day. For all crawler tractors. Installed on approval by your dealer.

Silver BOOSTER MANUFACTURING CO.
1406 SOUTH GRAND AVENUE
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ALL-DIESEL OPERATION PAYS FAUZIO BROTHERS

Widely-Known Pennsylvania Coal Stripping and Hauling Contractors Use WITTE Dieselectric Plants

"We have used WITTE Dieselectric Plants on a number of our shovels since 1938," writes Mr. Frank Fauzio, of Fauzio Brothers, Nesquehoning, Pa. "We do not hesitate to recommend your units for operation on shovels. They are economical and fit in very nicely with our operations as all our shovels are Diesel-powered."

Mr. Fauzio further mentions their Dieselectric Plants show savings records up to $125.00 yearly per unit, eliminate fire hazard and "have been very cheap for us both from repairs and fuel consumption. They are the best small Diesels that we have used in our business."

WITTE DIESELECTRIC TRADE-MARK REG. PLANTS

Coal stripping is rugged—extremely dusty. Men and equipment need real stamina to "take it"—and you can count on Dieselectric Plants performing as successfully on *your* projects. Sizes from 3 to 10 KVA-AC; 2.5 to 8 KW-DC. See your WITTE Dealer or write for literature now. *Have an all-Diesel outfit!*

WITTE ENGINE WORKS
DIVISION OF OIL WELL SUPPLY COMPANY — UNITED STATES STEEL CORPORATION SUBSIDIARY
AMERICA'S PIONEER BUILDER OF SMALL DIESELS KANSAS CITY 3, MO. U.S.A.

DON'T WAIT FOR WINTER!

ORDER NOW

Hydraulic Spreader Gives

√ Controlled Speed
√ Controlled Density
√ Controlled Direction

City, county and state highway departments use Hydro Spreaders because they provide the safe, sure way of spreading icy streets and roads. Easily installed on any dump truck with hydraulic hoist.

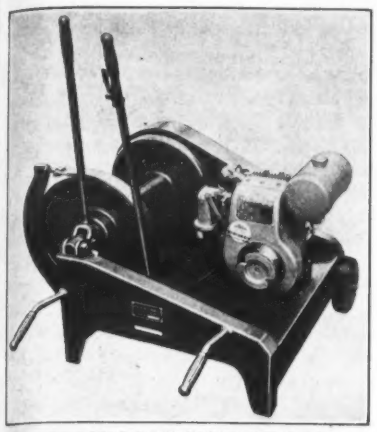
Material can be spread from 9 ft. to 35 ft. at speeds up to 30 m.p.h. All sprockets and chains are fully enclosed and material can be dumped over spreader without damage. One man can drive truck and operate spreader from cab.

An exclusive Hydro Spreader feature is the automatic gate opening device. When the driver starts the spreader the gates open and as the spreader is stopped the gates automatically close. There is no waste of material when spreader is not in operation. Hydraulic Spreaders are guaranteed to be free from defects in either materials or workmanship. Immediate delivery.

Write for illustrated folder. *Dealer territory available.*

Paul M. Cole Company, National Distributor, 30 N. La Salle St., Chicago, Ill.

Hydro Spreader Corp. 247 Madison Street Waukesha, Wisconsin



The new Model 500 light-duty hoist announced by American Hoist & Derrick Co. develops a 500-pound single-line pull at 200 fpm. It has a 4.2-hp gasoline engine and weighs 410 pounds.

Light-Duty Hoists

A hoist designed for lifting roofer's or mason's materials and for other small light-duty hoisting jobs is announced by the American Hoist & Derrick Co., 63 So. Robert St., St. Paul 1, Minn. Known as the Model 500, it is said to develop a single-line pull of 500 pounds at 200 fpm. Optional ratings from 650 pounds at 150 fpm to 200 pounds at 500 fpm are available on order.

The roofer's hoist is powered by a 4.2-hp single-cylinder air-cooled gasoline engine. It is equipped with pressed-steel wheels and wheelbarrow-type handles. Total weight of the hoist and engine is 410 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 113.

New Steam Generator

A steam-generating unit which will burn light oil, heavy oil, or gas has been developed by Orr & Sembower, Inc., of Reading, Pa. According to the manufacturer, all three fuels are burned with the same burner, making a changeover from one fuel to another possible in 10 minutes or less.

The Powermaster boiler systems range in capacity from 15 to 200 hp and are said to be fully automatic. Other advantages claimed include modulated control of flame volume to maintain constant steam pressure as steam demand varies, simplified maintenance and design, a free-swinging rear cover which quickly exposes tubes for cleaning, an air-atomizing burner designed to promote complete and clean combustion, and safety features to shut off the boiler in case of flame failure.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 15.

Data on Power-Tool Line

A line of portable power tools is described in a 20-page catalog put out by the Mall Tool Co., 7738 S. Chicago Ave., Chicago 19, Ill. Bulletin No. 746 consists largely of photographs of the various power tools which comprise the Mall line. Accompanying each photograph is text which lists the tool's specifications and describes the job it is intended to do. The text also covers the various accessories designed to increase the usefulness of Mall tools.

Items listed in the catalog include the MallSaws, the Mall saw stand, MallDrills, attachments for use with the drills, drillstands, MallSanders, portable polishers, flexible-shaft grinding and sanding machines, carpenters' planes, concrete vibrators, chain saws, and others.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 104.

Promotions at Hyster Co.

Several staff members have been promoted by the Hyster Co. of Portland, Oreg. Paul Brainard, former Assistant Supervisor of Hoist Design, is named to head the newly created Engineering Standards Department. R. E. Stiegele, former District Representative, is transferred to the General Sales Department in Portland, Oreg., to handle special sales assignments for the General Sales Manager; W. R. Hunt replaces him in the southeastern territory. And William Morrow is named Chief Accountant for the Portland, Oreg., office.

This traveling blacksmith and welding shop is mounted on a Mack chassis and is fully equipped with forge and tools. It was recently put into operation in Kern County, Calif., which has an area of 8,170 square miles. This recent innovation in mobile road-service is proving highly successful there, in an area where great distances demand on-the-job equipment repairs.

MILITARY TRUCK PARTS

Every part for every G.I. type vehicle from jeep to 20-ton prime mover 6x6. 40% to 80% below list.

COMPLETE STOCK OF PARTS FOR STANDARD CONVENTIONAL CARS AND TRUCKS

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New - used - rebuilt Truck operators, dealers, garagemen, learn about amazing low prices.

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NORTHWESTERN AUTO PARTS CO.

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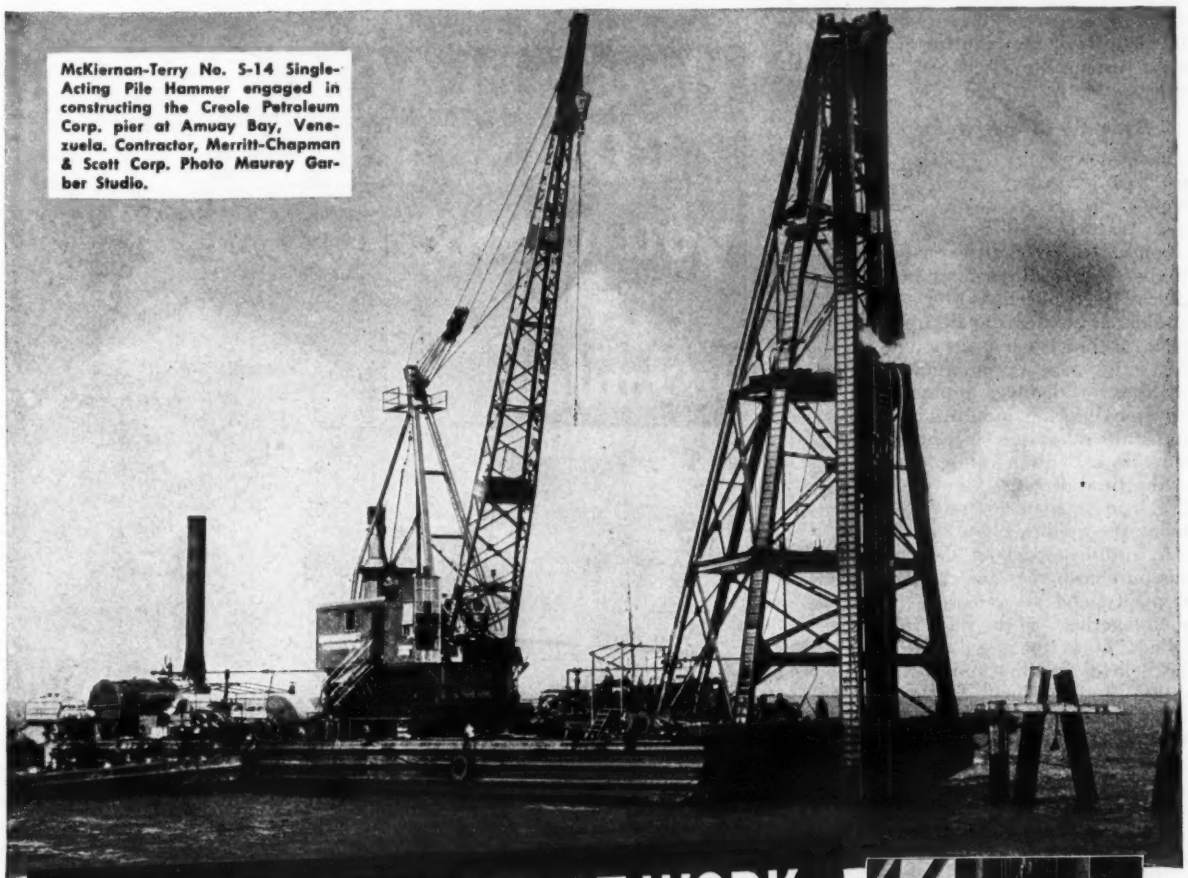


McKiernan-Terry No. S-14 Single-Acting Pile Hammer engaged in constructing the Creole Petroleum Corp. pier at Amuay Bay, Venezuela. Contractor, Merritt-Chapman & Scott Corp. Photo Maurey Garber Studio.

FAMOUS HAMMER AT WORK IN SOUTH AMERICA

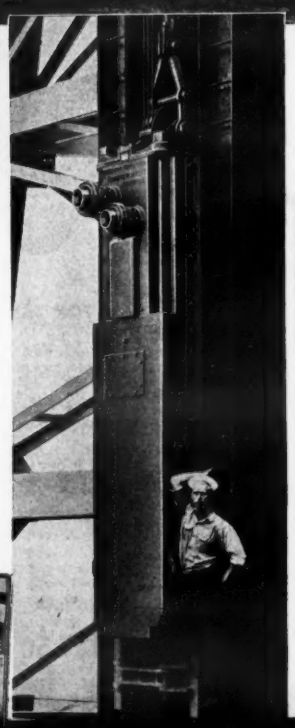
This huge single-acting hammer, operated from the world's largest floating pile driver, is one of the famous pair first used in constructing the 10,050-foot bridge over the Potomac River at Ludlow Ferry, Md.

One of the pair was later employed to drive test piles for the Morganza Spillway in the lower Mississippi. At Amuay, Venezuela, the big hammer is shown at work on still another difficult project.

Widely chosen by engineers and contractors for power, dependability, safe operation and endurance, McKiernan-Terry Pile Hammers lead busy lives. Now available in a complete, standardized line —10 double-acting sizes, 5 single-acting sizes and two sizes of double-acting extractors.

DESCRIPTIVE LITERATURE

Write for information and specifications on McKiernan-Terry Double-Acting and Single-Acting Pile Hammers to have handy in your files.



McKIERNAN-TERRY CORPORATION

Manufacturing Engineers

19 PARK ROW, NEW YORK 7, N. Y.

MK-261

McKiernan-Terry PILE HAMMERS AND EXTRACTORS

Grass-Seed Purchase For Roadside Projects

Carefully Written Specifications With Wide Latitude Above Minimum Set Up by New York State to Insure Economy and Satisfactory Results

By NELSON M. WELLS, Director, Landscape Bureau, New York Department of Public Works

✦ BECAUSE grass seed for highway and other governmental programs is purchased by open competitive bidding, the specifications for it must be carefully written. Seldom is there an opportunity to invite quotations from two, three, or four chosen vendors. Instead, offers are accepted from all sources. The top and bottom limits of whatever will be acceptable must therefore be stated in words, and the awards then given to the lowest bidder who offers qualities meeting the specifications. Equally comprehensive specifications are required for seeding work done by contract, and the contractor is thus made responsible for choosing reliable seedsmen.

Systems of Specifying Seed

Several systems of specifying and purchasing grass seed have been evolved in the past few years. The basic feature in all of them is a definition of the percentage of purity and the percentage of germination for each kind of seed purchased. One of these systems stipulates the desired percentages of purity and germination and then either pays a premium for superior qualities or deducts a portion of the cost for inferior qualities. This sliding scale of values is complicated to compute and often invites controversy at the time of bill settlement. It may also lead to planting seeds which are below the qualities actually desired.

According to a later development in this purchasing system, the percentages of purity and germination are multiplied together and the resulting figure is called "pure live seed". This widens the field of bidding and permits seeds with a range of purity and germination to be furnished from stocks at hand. And, generally speaking, it furnishes an equal quantity of living seeds per unit of area sown. For example, a specification of 81 per cent pure live seed might mean percentages of purity and germination of 90-90 or 98-83, etc.

A further progression in this system is to multiply together the purity, germination, *and weight* to get an end figure of "weight of pure live seed". This permits either a greater weight of low-quality seed or a lesser weight of superior-quality seed to be supplied. It gives an even wider latitude of permissible stocks to be furnished.

New York State's System

The system of specifying seed qualities for work done on contract for the Department of Public Works in New York State represents a variant of some of these systems.

First, the kinds of seeds must be separately packaged so they can be mixed after they are received on the job. Some purchasing agencies permit the seed formula to be mixed by the seedsman under the inspection of a representative of the purchaser. But even an expert inspector cannot always detect a dilution or substitution in all of the many stages of a mixing process. An inspector at the mixing bin provides only limited assurance of an accurate mixture and he is a nuisance to the vendor. Also, once the seeds are mixed, it is harder to sort and test them in order to verify the mixture or the purity of the respective seeds. Separate lots of seeds, on the other hand, are easier to test, and they permit the seeding formula to be varied at the time of seeding, if that is desirable.

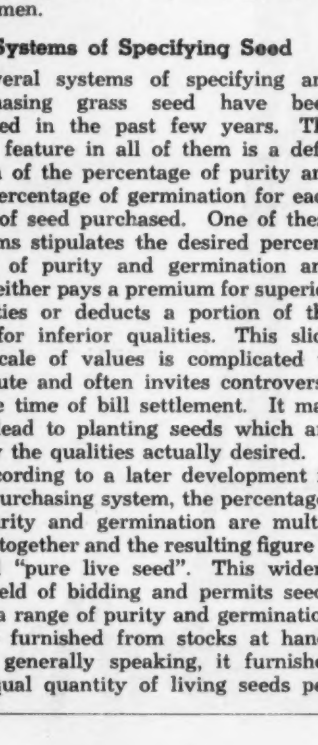
New York further specifies the kind of seed by its English and Latin names; the name of the strain is added if this is especially desired. Also, latest crop seed is required, to avoid the lower germination which results from age, poor storage conditions, etc.

New York specifies on the basis of the weight of pure live seed and includes a *minimum permitted percentage* for both purity and germination. This provides protection against a shipment with a very low rate of germination, compensated by an excess bulk.

"There—see what I mean?"

If a certain kind of grass is specified at 75 per cent purity and 75 per cent germination, the pure live seed is then

(*Concluded on next page*)



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HEAT FOR ALL

Portable Heaters expedite Winter work at small cost! Emergency heat for any purpose. **DRIES** concrete, plaster, grain, paint, lumber, etc. **STARTS** cold motors, trucks, tractors, airplanes, etc. **THAWS** frozen materials, plumbing, machinery and men. These Stewart Warner war surplus preheaters produce 100,000 B.T.U.'s per hour on 1½ gallons gas and deliver same anywhere thru three long ducts. Starts like outboard motor. Order now . . . Supply limited. Spare parts available.
Enclose check or money order or send ⅓ deposit, balance C. O. D. with privilege of examination.

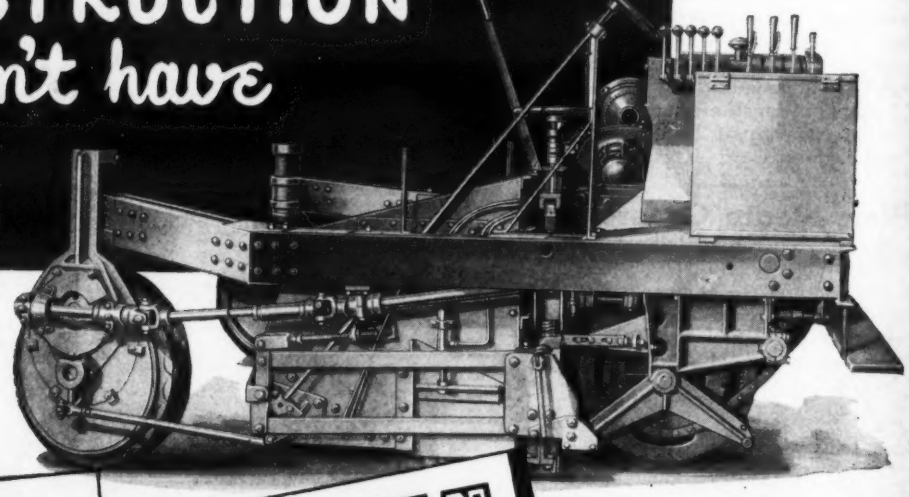
New and unused.	Rebuilt and test run
~~$630.00~~	~~$630.00~~
Now	Now
$295.00	$187.50
F.O.B.	F.O.B.

Quantity Discounts

KARL ORT

Department CE2
YORK, PA.

Here's BLACK TOP PAVER CONSTRUCTION you won't have to rebuild!



It's an ADNUN TRADE MARK REGISTERED BLACK TOP PAVER

- **Hydraulic Controls** — for easy handling
- **Continuous Course Correction**—corrects irregularities with successive courses
- **Powerful Six Cylinder Engine** — power to handle the heaviest truck
- **Four Wheel Drive**
- **Cutter Bar**—overlaps and compacts joint—"crowds" and compacts materials
- **Power Cut-Off**—permits carrying load over intersections and eliminates tag-end run-outs
- **End Gates** — permit feeding material out to sides with cutter bar extension
- **Screed Heater**—assures better handling of material
- **Crowning Adjustment** — for any crown or bank
- **Either Rear Roller**—can be disengaged for quick turning
- **Hopper** — big . . . adjustable . . . for narrow pavements
- **Sturdy, Heavy Construction**—that stands the strain of work without constant rebuilding
- **Adnun Carryall**—easily attached . . . makes moving up on jobs easy

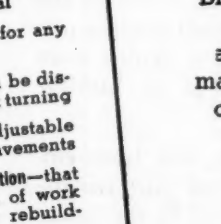
LOOK at that frame! There is design and construction that won't beat itself to pieces in handling heavy trucks up grades or in the rough going that is often a part of the job of spreading stone and slag.

Four Wheel Drive spreads the travel load over the whole machine and facilitates handling and smoother control for the reduction of shock.

Users have found that they don't have to rebuild Adnun Black Top Pavers.

Look over the other features listed here. No other Black Top Paver brings you such a combination of advantages. Adnun brings you smooth pavements at lower cost and longer machine life. You will be making plans for the future. Let us send you a catalog on the Adnun and if you are figuring on concrete paving you will want the Multi-Foote Catalog, too.

THE FOOTE COMPANY, INC.
Subsidiary of Blaw-Knox Co.
1916 State Street Nunda, New York



• For your concrete jobs—ask about the MultiFoote Duo-Mix (Double Drum) 34-E Paver and the MultiFoote Single Drum 34-E Paver. They bring you advantages found in no other concrete paver.

FOOTE

MULTIFOOTE CONCRETE PAVERS
ADNUN BLACK TOP PAVERS
Kinetic ASPHALT MIXERS

See also page 52

75 times 75 divided by 100, or 56.25 per cent. The difference between this figure and 100 per cent is 43.75 of *other material*. New York specifies how this other material can be comprised, namely: chaff, inert material, hulls, live seed of other crop plants, non-viable seed, etc. And in another clause, it also limits the amount of weed-seed content at 1 per cent of the shipment.

To review a specific case, suppose 125 pounds of pure live seed of Kentucky bluegrass is required. The specification calls for a purity of 85 per cent minimum and germination of 80 per cent minimum. If the seedsman just met these minimums, he would have to furnish 184 pounds of seed. Another seedsman has better qualities on hand. He can furnish Kentucky bluegrass seed which has 95 per cent purity and 90 per cent germination. In order to supply 125 pounds of pure live seed, he would have to ship only 146 pounds of grass seed or about 20 per cent less bulk than the other seedsman.

The quality of seed furnished must, according to New York State law, be clearly stated on the package label. Often a further certification by an approved State Seed Improvement Cooperative Association is required. This covers the desired information with regard to named varities and strains by giving the true name and the source from which the seed was grown.

The seed may be sown immediately upon receipt. But as a protection to the using agency, the certifications are verified by having a State official draw representative samples of the seeds after they are received and before they are mixed. These samples are sent to the State Laboratory for testing, and if the tests agree with the certification, all is well. The seed has probably already been sown anyway. But if the tests show a deficiency, the contractor will be penalized by being required to furnish and sow the amount of the deficiency at the next approved seeding season.

This system has seemed to work out fairly all around. The purchase of seed is essentially the greatest liability for the seeding contractor. The State has specified where the seeding is to be done, the kind of soil, the soil preparation, the kind and rate of lime, the kind and rate of fertilizer, the kind and rate of seeding, and the season for the work. The contractor is not responsible for a guarantee which would include reseeding, except in washouts; so he has actually but one complete operation to accomplish and the seed itself is his chief liability. If he buys his seed and gets a genuine certification from a reputable seedsman, he is all right. But if there is a fault in this one phase, the penalty of coming back to the job and overseeding say 2 pounds of grass seed per acre will probably encourage real caution in selecting his seedsman. It may also encourage him to add just a margin over the minimum requirements as a further protection. This extra is permitted by the contract.

One other detail in this program has to do with legumes. A delayed germination in a proportion of the legumes is satisfactory in highway work, so a relatively high percentage of hard seed is permitted. The inoculants must in all cases be pure culture, registered, not over one year old, and of an approved type for each particular variety of legume.

Although this system is especially designed for roadside work in New York State, and is not very different from the systems most recently evolved for large-scale seeding of airfields, it does represent radical variations from the seed-purchasing methods of a few years ago. It appears to have the following merits: it opens the bidding to a greater range of dealers; it permits a wide latitude of qualities above a reasonable low limit; and it penalizes someone along the line if the specification for the seed purchase is wilfully defaulted.

From a paper presented at the 20th Annual Conference, New York State Association of Cemeteries, Inc., Albany, July 19, 1948.

Line of Conveyors

A redesigned line of conveyors, car unloaders, and loaders is announced by the conveyor division of George Haiss Mfg. Co., Inc., a division of Pettibone Mulliken Corp., 141st to 144th St., on Park Ave., New York 51, N. Y. The Haiss line includes the Model 481 flat-belt conveyor, the Model 482 trough conveyor, the Model 483 belt-type car unloader, the Model 484 drag-type car unloader, the Model 485 freight and package conveyors, the Model 486 medium and heavy-duty drag-type conveyors, crawler and wheel-type heavy-duty bucket loaders, snow loaders, and clamshell buckets.

Further information on these products may be secured from the company, or by using the enclosed Request Card. Circle No. 69.

Check these advantages!

Compare the Features of the High Discharge Transport Truck Mixer:

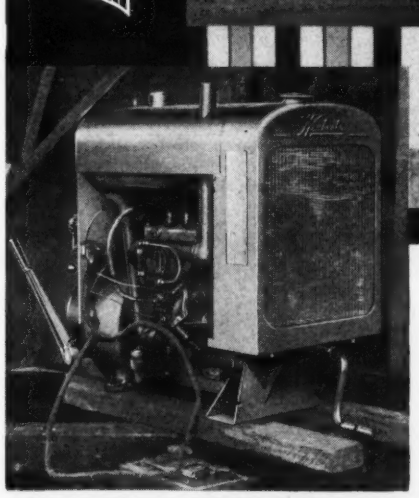
Write for full details on this durable, efficient mixer.

- VISIBLE MIXING
- FAST OPEN TOP CHARGING
- FULL VIEW INSPECTION
- ALL STEEL CONSTRUCTION
- SUPERIOR MIXING ASSURES QUALITY CONCRETE
- ALL BEARINGS FULLY PROTECTED FOR LOW MAINTENANCE
- GOOD DELIVERY

CONCRETE TRANSPORT MIXER CO., INC.

4984 Fyler Ave., St. Louis 9, Missouri

IN NEW ZEALAND...



ICKU Power Unit—4 cyl., 2½ in. bore x 3⅛ in. stroke, 61 cu. in. displ. Max. gov. speed continuous 2000 rpm.

even the horses are WAUKESHA POWERED

■ In New Zealand, these horses go round and round, and never get tired at all. That's fun for their riders. But for their owners it's funds.

In an American popular song, the merry-go-round broke down. This is the story of the merry-go-round that *didn't* break down—because its horses have Waukesha horsepower. And Waukesha horsepower is *real horsepower!*

Ask Mr. Johnson of New Zealand. He's in the amusement business. He will tell you that when the power unit on any type of ride breaks down, nobody is amused. And the showman loses money. That's why he switched to Waukeshas.

His merry-go-round and its ICKU Waukesha Power Unit are shown here. He also has a Chair-o-plane ride with a Waukesha Power Unit, Model FCU, 4 cyl., 3¼ x 4 in. bore and stroke, 133 cu. in. displ., max. governed speed continuous 1800 rpm. He regularly runs both of these Waukesha units continuously for five and six hours daily. No breakdowns yet, in over two years of operation.

In Mr. Johnson's book Waukesha stands for reliability *and* revenue! He says his Waukesha units cost less to operate than those he replaced, but Waukesha all-around dependability is far more important to him. Users of Waukesha-powered industrial machinery all over the world agree with him. Get Bulletin 1408; or if it's Diesels you need, inquire about Models 180-DABU and 190-DLCU.

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WAUKESHA ENGINES

Pre-Designing a Job Ups Safety and Economy

Advance Analysis Spots Potential Hazards and Helps Contractor Control Them On a Concrete-Placing Job Where Truck-Mixers and Cranes Are Constantly Moving

By F. J. CRANDELL, 1947-48 General Chairman, Construction Section, National Safety Council, and Assistant Vice President, Liberty Mutual Insurance Co., Boston

✦ CONTRACTORS can cut their accident losses fully 60 per cent if they will adopt the following logical, foresighted procedure: (1) have their superintendents, foremen, or executives design job operations *in advance;* (2) have them record those designs *on paper;* and (3) have their safety engineers analyze the operations as designed, to determine where accidents are likely to occur and how to control or eliminate them. (See C. & E. M., April, 1948, pg. 79.)

The need for such a procedure is particularly well illustrated in job operations which call for heavy equipment. The movement in these operations is primarily a movement of equipment. But though the men involved are usually either stationed at specific locations or are riding the equipment, they may have to move from their assigned locations. And if the contact between men and heavy equipment is uncontrolled, major injuries are likely to occur from crushing, collision, or falling.

Now it is often impossible to control the movement of men, but the movement of equipment *can* be directed—and therefore controlled—by advance design and analysis of the whole job operation. Once the design is recorded on paper, it can be studied to determine the areas where accidents may occur, and to estimate the probable amount of exposure. If those accident areas and that exposure can be reduced by redesigning the operation, well and good. Even if they cannot, the contractor's supervisory personnel at least know where the hazards are and can proceed accordingly.

Sample Job and Analysis

Let us take, for illustration, the problem of pouring concrete in a high wall. The heavy equipment involved consists of a fleet of 5-yard-capacity truck-mixers with 158-inch wheelbases, and two cranes to lift the 1-yard bottom-dump concrete buckets to the high wall forms.

The contractor can hardly afford to let the truck-mixers come to the job as their drivers see fit. He can hardly leave the direction of their movement up to the drivers. He cannot assume that because he doesn't own the trucks there will be no loss to him or accidents to his men. It is essential that he have his superintendent design the operation completely, in advance and on paper, so that the hazards can be spotted and either controlled or eliminated.

The two diagrams which accompany this article show an advance design and then a re-design of the operation.

Study of the first diagram, the original design, reveals serious hazards to workmen and equipment in the movement of the truck-mixers. These units are required to turn off a public thoroughfare at the risk of collision with traffic and pedestrians, and to enter and travel along a ramp at the risk of collision with other truck-mixers exiting from it.

A truck-mixer which is to deliver its load to Crane B, for example, must drive in between both cranes to position B2 at the risk of crushing workmen or colliding with another truck-mixer at position A2. Then it must back about three lengths from position B3 to B4 to dump its load to the concrete bucket, still at the risk of colliding with the truck-mixer at position A2 or of crushing a workman. As soon as it is empty, it must get into position B5 and back another three lengths to B6 before it can return up the ramp to B7 and exit.

Not only does the movement of the

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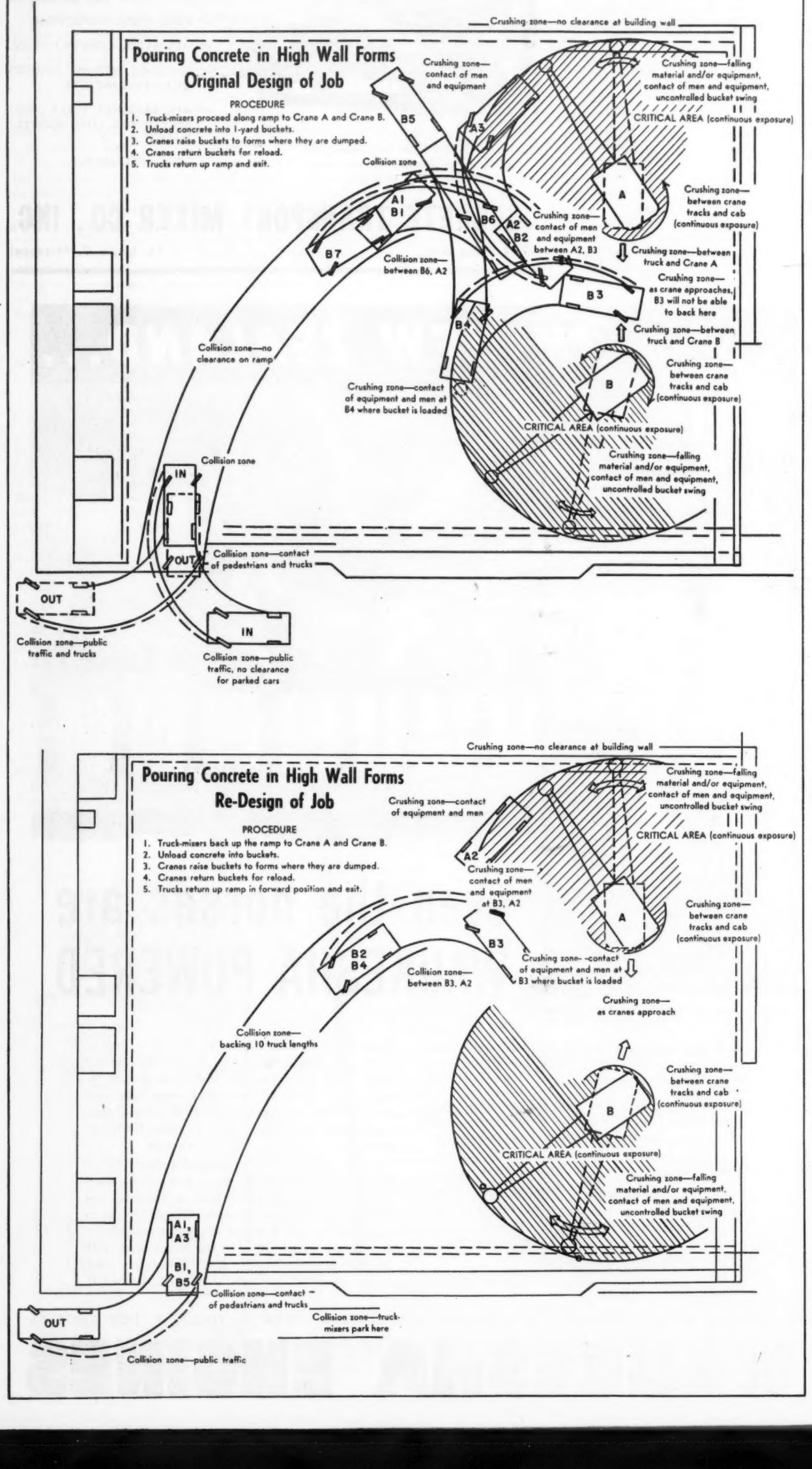
Pouring Concrete in High Wall Forms
Original Design of Job
PROCEDURE
1. Truck-mixers proceed along ramp to Crane A and Crane B.
2. Unload concrete into 1-yard buckets.
3. Cranes raise buckets to forms where they are dumped.
4. Cranes return buckets for reload.
5. Trucks return up ramp and exit.
Crushing zone—no clearance at building wall
Crushing zone—contact of men and equipment
Crushing zone—falling material and/or equipment, contact of men and equipment, uncontrolled bucket swing
CRITICAL AREA (continuous exposure)
Collision zone
Crushing zone—between crane tracks and cab (continuous exposure)
Crushing zone—contact of men and equipment between A2, B3
Crushing zone—between truck and Crane A
Collision zone—between B6, A2
Crushing zone—as crane approaches, B3 will not be able to back here
Crushing zone—between truck and Crane B
Collision zone—no clearance on ramp
Crushing zone—contact of equipment and men at B4 where bucket is loaded
Crushing zone—between crane tracks and cab (continuous exposure)
CRITICAL AREA (continuous exposure)
Crushing zone—falling material and/or equipment, contact of men and equipment, uncontrolled bucket swing
Collision zone
IN
OUT
Collision zone—contact of pedestrians and trucks
OUT
IN
Collision zone—public traffic and trucks
Collision zone—public traffic, no clearance for parked cars
A1
B1
A2
B2
A3
B3
B4
B5
B6
B7
A
B
Pouring Concrete in High Wall Forms
Re-Design of Job
PROCEDURE
1. Truck-mixers back up the ramp to Crane A and Crane B.
2. Unload concrete into buckets.
3. Cranes raise buckets to forms where they are dumped.
4. Cranes return buckets for reload.
5. Trucks return up ramp in forward position and exit.
Crushing zone—no clearance at building wall
Crushing zone—contact of equipment and men
Crushing zone—falling material and/or equipment, contact of men and equipment, uncontrolled bucket swing
CRITICAL AREA (continuous exposure)
Crushing zone—contact of men and equipment at B3, A2
Crushing zone—between crane tracks and cab (continuous exposure)
Crushing zone—contact of equipment and men at B3 where bucket is loaded
Collision zone—between B3, A2
Crushing zone—as cranes approach
Collision zone—backing 10 truck lengths
Crushing zone—between crane tracks and cab (continuous exposure)
CRITICAL AREA (continuous exposure)
Crushing zone—falling material and/or equipment, contact of men and equipment, uncontrolled bucket swing
A1, A3
B1, B5
Collision zone—contact of pedestrians and trucks
Collision zone—truck-mixers park here
OUT
Collision zone—public traffic
A2
B2
B4
B3
A
B

truck-mixers create hazards peculiar to this operation. There are the accompanying dangers to workmen always present in the movement of bucket-handling cranes: exposure to crushing between crane cab and tracks, and to contact with the bucket as it is raised and lowered or as it swings uncontrolled. Moreover, workmen on the high wall forms of this job are exposed to an unprotected falling area.

Advance analysis reveals all these hazards. It spotlights critical areas near the cranes as they swing buckets back and forth from loading to pouring positions, and near the truck-mixers as they nose and back around in between. It is now up to the contractor or superintendent to decide whether he wants to proceed in this manner or to study a re-design. If he decides to proceed, he can give a copy of the design procedure to all truck operators to indicate how they are to get in and out of the working area. He can also present the drawing to foremen and workmen to indicate to them the amount and location of hazards so they can take care of themselves better, especially if they have to leave their assigned positions on the job.

Re-Design

But the contractor or superintendent may wish to study a re-design of the operation before he proceeds. The second diagram with this article shows such a re-design. It calls for the truck-mixers to *back* down the ramp to their loading positions at Cranes A and B. Such a procedure does away with many of the crushing and collision zones near the cranes, though it brings into existence another exposure—backing ten truck lengths on the ramp.

In any case, the contractor or superintendent now has all the facts before him, thanks to advance design and analysis. He has a choice of procedures and a choice of hazards. With the help of the safety engineer, he will be able to decide which set of hazards he can better control, and which procedure will mean fewer accident losses on this particular job. Whichever procedure he chooses, he is now forewarned about the specific danger areas—and therefore forearmed.

Pavement Resistance To Skid Is Measured

A research report on pavement skid resistance—by Tilton E. Shelburne, Director of Research, and R. L. Sheppe, Associate Research Engineer, Virginia Department of Highways—has been issued by the Highway Research Board of the National Research Council. This report, No. 5-B, is based on more than 1,000 measurements of forward-skidding distances on 32 pavement surfaces in Virginia. The tests were conducted on wet and dry pavements, on various types of surface, and with good and bad tires.

The report describes the test procedures used, the equipment and measuring devices employed, the location of the pavement surfaces tested, and other pertinent facts. The results are thoroughly tabulated and interpreted, and there are numerous illustrations.

All of the pavements tested in a dry condition were found to have a satisfactory resistance to skidding for speeds of 40 mph or less. The data also indicated that stopping distances at this maximum speed are critical only on wet surfaces. It was considered unsafe to conduct tests on wet surfaces at speeds over 40 mph.

For pavements tested wet, the types of surfaces were rated from lowest to highest in this order: special plant-mix, rock asphalt, seal treatments, sand asphalt, bituminous concrete, portland-cement concrete, broom-drag treatments, and surfaces with excess asphalt. It was pointed out that this rating applies only to the surfaces tested, and since only a few surfaces were included in some groups, too much emphasis should not be placed on this rating. It was also shown that the texture and composition of the surface has a great effect on skid resistance. For example, broom-finished portland-cement concrete roads were found to be much safer from a skidding standpoint than smooth or belt-finished concrete.

Obviously, good tread tires were found to offer greater resistance to skidding than smooth or worn tires. This was particularly true on the fine-textured surfaces, and not so pronounced on the more open-textured ones. The composition of the tire is also a factor which affects skidding. The average stopping distance with smooth-tread synthetics, as computed by the tests, was 11.7 per cent longer than with smooth-tread natural-rubber tires.

Copies of Research Report No. 5-B can be obtained by writing to the Board's publication offices at 2101 Constitution Ave. N. W., Washington 25, D. C. Price of the book is 45 cents.

"Decal" Identification

A rapid and uniform means of identifying or marking equipment is by the use of decalcomanias. One manufacturer of this type of material is Superior Decals, Inc., Ft. Worth Ave. at Westmount, Dallas 11, Texas.

The company points out that Super-Cals are made entirely of du Pont Dulux synthetic enamel, 0.004 inch thick. It states that this extra thickness allows for ease of handling and reduce waste at the time of application.

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For the Finest in Decals . . . Get
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"Job-Rated" TO FIT THE JOB

Trucks that *fit your job* . . . save you money. They save in many ways.

They save on gas, oil, and tires. They save on upkeep and repairs. They stay on the job. They last longer.

For such a truck, see your Dodge dealer. Tell him what you haul . . . the weight of your load . . . and your operating conditions.

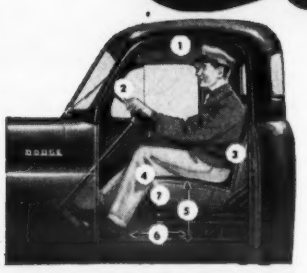
He will then recommend a Dodge "*Job-Rated*" truck that has been engineered and built to fit *your* job.

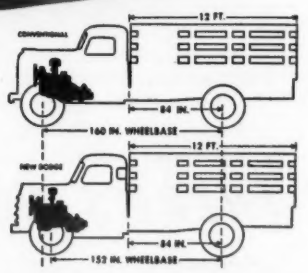
Your new truck will have "*Job-Rated*" power, for performance with economy.

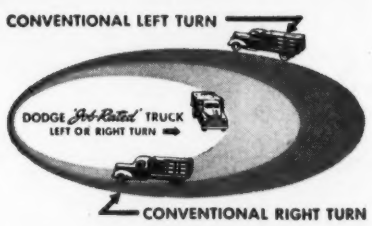
Every other unit . . . clutch, transmission, brakes, rear axle, springs and tires will be "*Job-Rated*" for long life and dependable operation.

For the location of the Dodge dealer in your community, consult the yellow pages of your telephone book.

PLUS... these important NEW features







SHORTER TURNING DIAMETERS

New Dodge "*Job-Rated*" trucks provide an entirely new ease of steering and handling. You can turn in much smaller circles, right and left, because of a new type of "cross-steering," plus shorter wheelbases and wider tread front axles.

MORE COMFORT AND SAFETY

1. Plenty of headroom. **2.** Steering wheel, right where you want it! **3.** Natural back support, adjustable for maximum comfort. **4.** Proper leg support. **5.** Chair-height seats. **6.** 7-inch seat adjustment, with convenient hand control. **7.** "Air-O-Ride" cushions, adjustable to weight of driver and road conditions.

BETTER WEIGHT DISTRIBUTION

New Dodge "*Job-Rated*" trucks have *much* better weight distribution. You can haul *more payload*. This has been achieved by moving the front axle back, *under* the frame, and moving the engine forward. More of the load is carried on the front axle. Wheelbases are shorter . . . but cab-to-rear-axle dimensions are unchanged.

DODGE "Job-Rated" TRUCKS

FIT THE JOB . . . LAST LONGER !

Highway Maintenance Costs Rising in 1948

Cost Trends for Labor, Material, Equipment, and Overhead, Total a Rise of 8 Per Cent Over 1947

✦ STATE engineers who are preparing their budgets for the coming year will be interested in a report on present highway maintenance costs which has been issued by the Maintenance Division of the Public Roads Administration. It was prepared from data on unit maintenance costs which the states submitted in response to a PRA memorandum of last May. It covers the first half of 1948, and it is designed to bring up to date a 1947 report by the Highway Research Board.

The present cost of maintaining and operating our national system of highways, the report points out, is over 8 per cent higher than in 1947. The 1947 index stood at 171.28. The 1948 index now stands at 186.4. The trends of labor, material, equipment, and overhead costs, are all well above the 1947 level—are at an all-time high, in fact, as shown by the following table of yearly costs.

HIGHWAY-MAINTENANCE COST INDEX

Year	Labor	Material	Equipment	Overhead	Total
1935	100.00	100.00	100.00	100.00	100.00
1936	102.19	104.31	97.97	100.29	101.24
1937	108.48	104.42	99.31	102.50	104.46
1938	110.17	103.73	103.51	103.97	106.36
1939	111.29	101.64	105.87	105.83	107.23
1940	112.33	100.30	107.12	110.20	108.13
1941	121.16	102.86	110.11	111.33	113.30
1942	134.93	115.68	113.27	113.93	122.83
1943	151.82	117.76	114.46	116.87	130.88
1944	162.42	123.22	116.77	119.81	137.34
1945	171.16	130.10	129.89	135.01	147.52
1946	180.56	132.62	141.28	148.30	156.40
1947	198.40	145.83	153.39	162.38	171.28
1948 (first half)	212.74	161.20	171.60	170.42	186.42

Labor, Materials, Equipment

The average maintenance labor rate has risen approximately 7 per cent to an all-time high of 212.7. This indicates a uniform continuation of the trend established over 4 years ago. The average hourly rate paid to common labor in 1935 was $0.365. It is now $0.785, an increase of 115 per cent since that time. The average rate paid to all maintenance labor, including common labor, skilled labor, equipment operators, patrolmen, and foremen, was $0.415 in 1935. It is now $0.883, an increase of 113 per cent.

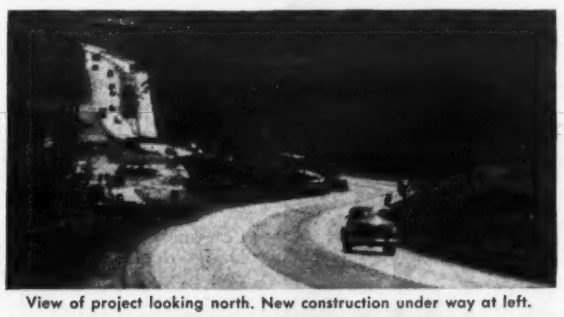
The cost index of maintenance materials is now 161.2, or 11 per cent higher than in 1947. This large increase indicates an extension of the sharp rise in material prices that became evident in 1946. It is due in large part to the cost of liquid bituminous materials which has increased a little over $0.02 per gallon, 21 per cent, since 1947. Other material items, too, with the exception of paint, have increased.

The average equipment rate has increased 12 per cent. This is due, primarily, to the acquisition by the states of new and higher-priced equipment, necessitating an increase in the dollar value of depreciation rates. At the same time, labor rates for equipment maintenance, prices of replacement parts, and costs of fuel have increased. These further increased the cost of operating both the old and the new equipment. The index for maintenance-equipment rental now stands at 171.6.

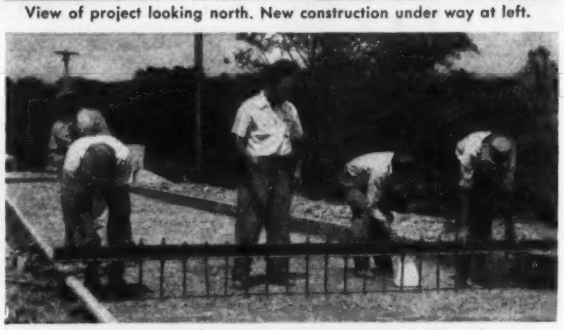
(*Concluded on next page*)

Looking south. Old road made sharp turn at bottom of hill, before crossing narrow bridge (left). New road at right will be straight as a die.

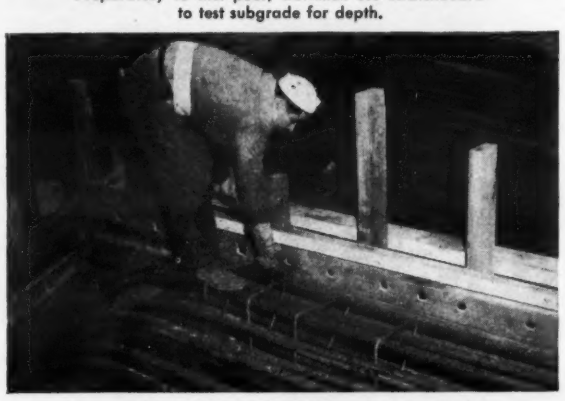
Eliminating Dangerous Curve on U.S. Route 1



View of project looking north. New construction under way at left.



Preparatory to first pour, workmen use scratchboard to test subgrade for depth.



Close-up of Bethlehem Reinforcing Bars, 291 tons of which were used in new bridge.

Henry Acchione (left) of Acchione Contracting Co., discusses bridge specifications with (left to right): Charles A. Burn, resident engineer, Pa. Dept. of Highways, partner Daniel Acchione, and Richard Allen, senior construction inspector, Pa. Dept. of Highways.

The combination of a steep hill, sharp turn, and narrow bridge had long brought trouble to motorists using U. S. Route 1 at Ridley Creek, Media, Pa. To eliminate this traffic hazard, the Pennsylvania Department of Highways recently undertook some 3240 ft of 4-lane relocation, including construction of a 152-ft bridge. Acchione Contracting Co., Philadelphia, had the contract. Bar mats, dowel units and bridge reinforcing were furnished by Bethlehem.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

STEEL FOR HIGHWAYS

Dowel Units • Reinforcing Bars • Guard Rail Posts
Bar Mats • Guard Rail • Wire Rope and Strand
Hollow Drill Steel • Spikes • Bolts and Nuts • Pipe
Sheet and H-Piling • Fabricated Structural Steel
Timber Bridge Hardware • Tie-Rods

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PERMANENT, BRIGHT

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NO PARKING LOADING ZONE

They sell faster, last longer, require NO maintenance, make more satisfied customers

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Immediate Shipment of all standard signs.

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CATAPHOTE Reflector Buttons and signs on the Pennsylvania Turnpike.

REFLECTORIZED SIGN & SIGNALS • GALVANIZED SIGN POSTS • STREET NAME SIGNS • DANGER SIGNALS • PARKING SIGNS • BUTTONS & CHAINS

KEEP INFORMED—

For further information and literature on products described in this issue, turn to pages 16 and 92 for the Red Request Cards. Our Reader Service Department will be glad to help you.

Contractors and Engineers Monthly
470 Fourth Ave.
NEW YORK 16, N. Y.

Overhead Costs

The overhead cost index has risen only 5 per cent since 1947. This rise is due to the wage and salary increases and cost-of-living bonuses granted by approximately half the states. It should be noted that this overhead item includes the salaries of clerks and stenographers, watchmen, etc., as well as engineering personnel. It does not represent the increase in engineering salaries. These have, in fact, been increased much less.

It will be noted that there has been a slight increase in the rate of rise of all the cost trends except overhead. It is believed that this is not as serious as it first appears to be, since this index for the first half of 1948 contains the greater part of the increase for the full year. This is due to the policy in effect in many states of contracting for a full year's supply of one commodity at one letting. It is therefore expected that the index for the last half of 1948 will be higher than the present index, but that the increase will not be as great as the increase from 1947 to the first half of 1948.

The effect of this increase in costs is shown in the following example. The average cost of maintaining and operating the nation's state highway system was $403 per mile in 1935. The cost of these same units of labor, material, and equipment was $436 in 1940. It is now $751, 86 per cent above the 1935 level.

Small Prime Mover Pulls 7-Yard Scraper

A small-size Tournapull is announced by R. G. LeTourneau, Inc., Peoria 8, Ill. Designed for self-loading, this one-man-operated unit is powered by a 100-hp diesel or gasoline engine, and will travel at speeds of up to 25 mph. It is used with the E-9 Carryall scraper which will hold 7 cubic yards heaped or carry a load of up to 9 tons.

A feature of the Model D Roadster Tournapull is the complete control of all steering and scraper operations by individual electric motors. Toggle switches for all controls are located on the control panel. A torque-proportioning differential automatically supplies power to the wheel on the firmest footing, says LeTourneau, permitting both wheels to pull at all times and preventing one wheel from spinning independently of the other.

The new D Roadster Tournapull, used with the E-9 Carryall, is designed for high-production earth-moving on small-yardage projects.

Multiple-disk air brakes on four wheels provide 3,132 square inches of braking surface. The Model D is mounted on 14 x 32 tapered-bead tires, and will turn in a 19-foot radius. It is 27 feet 10¾ inches in length, 8 feet in width, and 8 feet 6¾ inches in height including the cab. The cutting edge is 7 feet long, the wheelbase measures 15 feet 7⅜ inches, and the unit weighs 20,700 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 32.

Pocket Slide Rule

A pocket-size plastic slide rule is manufactured by the Plastilite Products Co., 32 Central Ave., Pawtucket, R. I. It is made of Vinylite and the scale is printed directly on the planished surface. The rule contains A, B, C, and D scales, and can be used for performing all operations within the range of these scales.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 92.

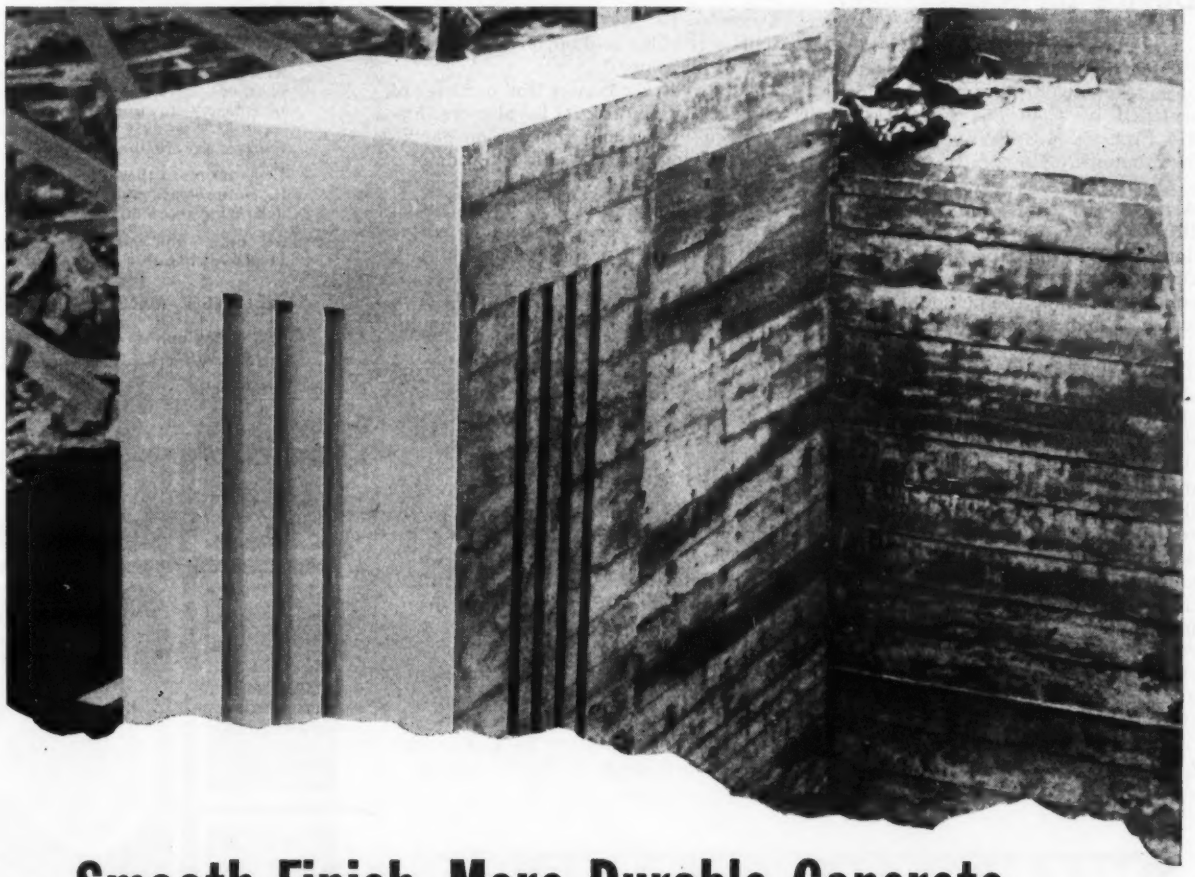
A-C Expansion at Oxnard

The Oxnard, Calif., plant of Allis-Chalmers Mfg. Co. is being expanded. The program includes the erection of a concrete-block building, a small prefabricated building, 240 feet of craneway, and the laying of 800 feet of railway track. The larger building will be used for steel-cutting operations; the smaller, as an experimental engineering building.

SPEED
STEP-UP Your Jobs
CUT-DOWN Your Costs

The simple wedge clamp illustrated above holds forms together, as well as the ties between forms. This eliminates the use of nails, spreaders or band irons, and requires the use of only one waler. The forms last 50 to 100 reuses without repair.
Symons Forms can be rented with purchase option or you may purchase the hardware with blueprints to make your own forms. WRITE TODAY for our big free booklet which completely describes the Symons forming system and accessories.

SYMONS CLAMP & MFG. CO.
4251 DIVERSEY AVE.
CHICAGO 39, ILLINOIS



Smooth Finish, More Durable Concrete
with Hydron Form Linings

The near side of the concrete slab in the above photograph was cast against Hydron form lining. Note the smooth, unblemished surface obtained without expensive rubbing.

Hydron absorbs excess water and eliminates trapped air from the surface. This makes the concrete several times more resistant to abrasion and freeze-thaw conditions. The case hardening effect is gradual from the surface into the mass for about an inch in depth. In addition to these benefits Hydron serves as a curing aid. When the forms are removed Hydron remains on the concrete and can easily be taken off after the desired curing period.

Hydron is mounted on wood forms with rapid fire staple guns and on steel forms with a special adhesive. Furnished in flexible sheets, Hydron can be easily cut or trimmed.

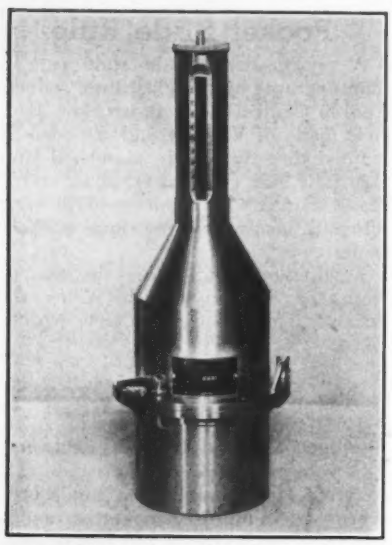
Among the big installations where this product was used are the Norfork Dam, the Soo Canal and lock walls and the new Maine Turnpike bridges.

NEW! Re-usable Rubber Bevel Strips Prove More Economical, More Efficient

The bevels or grooves in the above photograph were made by U. S. Rubber Bevel Strips. These strips produce a smooth finish with straight edges. And being flexible, they are easily removed for many more re-uses.

For more information write Mechanical Goods Division, United States Rubber Company, 1230 Avenue of the Americas, New York 20, N. Y.

A PRODUCT OF
U.S.RUBBER
SERVING THROUGH SCIENCE
UNITED STATES RUBBER COMPANY



In addition to measuring the amount of entrained air in concrete, the Roll-A-Meter also determines the specific gravity of cement, sand, gravel, and admixtures, and the percentage of free water in damp sand and gravel.

Device for Measuring The Air in Concrete

A device for measuring the amount of entrained air in concrete is manufactured by Concrete Specialties Co., 914 First Ave., Spokane 6, Wash., and distributed by Charles R. Watts & Co., 4121 Sixth Ave. N. W., Seattle 7, Wash. According to the manufacturer, the Roll-A-Meter can also be used for determining the specific gravity of cement, sand, gravel, and admixtures, and for obtaining the percentage of free water in damp sand and gravel.

In operation, the base of the unit is filled with a sample of the fresh concrete and is struck level. The top is clamped on and slowly filled with water through the baffle bottom funnel, so that the sample is not disturbed, nor the air released. When water rises into the glass on the neck, the funnel is removed and water added to the zero mark at the top. The top cap is put on, the meter is inverted and agitated until the concrete settles free from the base, and the meter is then rolled and rocked with the neck elevated until air rises to the top. The meter is set down and jarred lightly until the air has fully risen to the top. The percentage of air is read directly on the glass.

The Roll-A-Meter is 22 inches in height, has an 8-inch outside diameter at the center, a 130-cubic-inch volume in the base, and weighs 18 pounds without the carton or accessories.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 45.

Hard-Surfacing Rods Made in Two Grades

Additions to its line of hard-surfacing electrodes have been announced by The Lincoln Electric Co., P. O. Box 5758, Cleveland 1, Ohio. These are Tungweld-C and Tungweld-F. They are of the coated tubular type, and Lincoln recommends them for depositing super-abrasion-resisting surfaces.

Tungweld-C contains coarse particles of tungsten carbide. These particles are deposited by the arc in the weld crater and, as the weld solidifies, are held in a tough iron-alloy matrix. According to the manufacturer, when the edge of the iron alloy and the base metal wear away, the teeth-like particles of tungsten carbide are exposed, producing a self-sharpening edge. Tungweld-C is designed for surfacing earth-cutting tools and other tool surfaces subject to severe abrasion.

Tungweld-F contains fine particles of tungsten carbide. It is also recommended by Lincoln for use on earth-cutting tools, but is said to produce a smoother, thinner, and sharper edge than the Tungweld-C. It is best suited for use on mixer blades, dredge cutter blades, post-hole augers, pugmill knives, etc. Tungweld-C and Tungweld-F are available in 14-inch lengths in ¼-inch diameters. They are packed in 5-pound containers.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 28.

Williams Opens in Calif.

The J. H. Williams Co. announces the opening of a warehouse and sales office at 2266 E. 38th St., Los Angeles, Calif. This Buffalo, N.Y., concern manufactures a line of drop forgings, drop-forged tools, and welded connection units for speeding steel erection. The Los Angeles office will serve California, Oregon, Washington, Nevada, Utah, Arizona, New Mexico, Idaho, and western Montana. Charles F. Coates has been named Western District Manager.

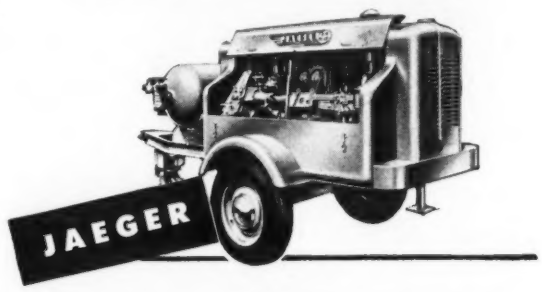
Solvent for Fuel Oils

A new pamphlet on its latest development in fuel-oil additives has been released by E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa. The new product, known as Houghto-Solv, is described in the pamphlet as a speedy, effective additive for removing sludge from fuel-oil systems.

The folder gives detailed information on how to use the product, where best to use it, and how it acts. Also listed are seven advantages claimed for it by Houghton. The final page of the pamphlet illustrates a method for testing this solvent.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 97.

MORE AIR
TO RUN MORE TOOLS



New Standard 125 ft. "Air Plus" can run 2 big breakers, or 3 medium breakers, 4 clay spades or 2 heavy sheeting drivers at full 90 lbs. pressure — do 30% to 40% more work than the same tools under mere 70 lbs. pressure.

Costs no more than inefficient "single breaker" 105 ft. compressors and uses no more fuel when not delivering more air.

All other new sizes are comparable. See your Jaeger distributor or get new Catalog JC-8.

THE JAEGER MACHINE CO., Columbus 16, Ohio

Regional Offices | 1504 Widener Bldg., Philadelphia 7 · 226 N. La Salle St., Chicago 1 · 235 American Life Bldg., Birmingham 1

with JAEGER "NEW STANDARD" SIZES

75 cfm instead of 60
125 cfm instead of 105
185 cfm instead of 160
250 cfm instead of 210
365 cfm instead of 315
600 cfm instead of 500

WINNING POWER!

WISCONSIN HEAVY-DUTY Air-Cooled ENGINES

Four of a kind — winning power to spare in this hand! The same winning power you draw when you specify Wisconsin Air-Cooled Engines for your equipment . . . compact, heavy-duty singles in two types ranging from 2 to 9 hp.; twin-cylinder models from 7 to 13 hp., and V-type 4-cylinder engines from 15 to 30 hp.

All models are designed for heavy-duty service — delivering "Most Hp. Hours" of on-the-job service.

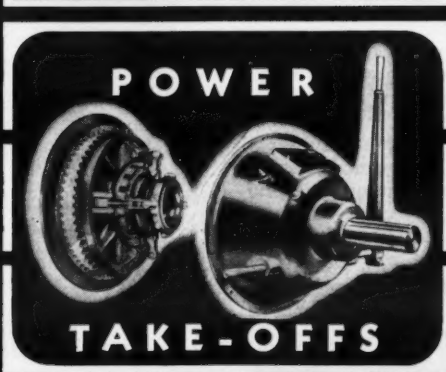
All models are extremely compact . . . to fit the machine as well as the job.

All models are built to one standard of top-quality excellence in design, materials and precision construction.

For "Winning Power", specify Wisconsin Air-Cooled Engines. Engineering data gladly supplied.

WISCONSIN MOTOR CORPORATION
World's Largest Builders of Heavy-Duty Air-Cooled Engines
MILWAUKEE 14, WISCONSIN

JUST THE RIGHT



ROCKFORD CLUTCHES

Your power control and transmission requirements, whatever they may be, will benefit from clutches that are exactly suited to their needs. Thousands of manufacturers — in hundreds of industries — have found that the right ROCKFORD CLUTCHES increase the efficiency of their machines. Our engineers are not restricted to any one type or size of clutch — but are free to specify one that is best suited to the particular operating essentials of your product. Write for our latest bulletin that shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS, with diagrams of unique applications, capacity tables, dimensions and specifications.

Learning Your Clutch Needs
Analysing the Problem
Designing the Clutch
Planning Production
Tooling Up
Manufacturing
Checking and Testing
Supervising Installation
Servicing
Automotive and Aircraft
Trucks and Busses
Tractors and Road Machines
Farm Machines and Implements
Oil Field Rigs and Pumps
Industrial
Mowers and Light Machines
Engines and Marine Units
Machine Tools Production Units

B-W ENGINEERING PRODUCTION

ROCKFORD CLUTCH DIVISION
BORG-WARNER
314 Catherine Street, Rockford, Illinois

Distributor Doings

AED Region 10 Confers

Members of the Associated Equipment Distributors in Texas and Oklahoma recently held a meeting in San Antonio. Its purpose was to review the year's activities and to discuss a variety of subjects pertaining to the construction-equipment industry—among them, the Army Affiliation Program, credits and collections, the economic outlook for the future, and activities of the Texas Good Roads Association.

The conference was headed by Jewel A. Benson, Director of Region 10 of the AED (Texas and Oklahoma). Speakers included W. W. Bucher, Executive Vice President of the AED; and Frank Knight, Executive Secretary.

Bacon Co. in Sacramento

The Edward R. Bacon Co. of San Francisco has opened a new office and warehouse in Sacramento, at 17th and E Sts. It is under the direction of Ed Conners as Office Manager. Salesmen are S. B. DeHart, Al Burrows, and Richard Tatterson.

The San Francisco office is located at 2101 Folsom St. Jack How is owner and General Manager of the company, and Gordon Harris is Office Sales Manager. The firm is distributor for more than 56 nationally known manufacturers of construction equipment. It has branches in Oakland, Fresno, and Stockton.

New Outlets for Gurley

W. & L. E. Gurley, of Troy, N. Y., announces the appointment of three new dealers for its line of engineering and scientific instruments. Sales in the New York metropolitan area will be handled by the L. L. Ridgway Co., 324 Lafayette St., and 277 Broadway, New York, N. Y. Coincident with the appointment, Gurley's New York office has been discontinued.

The Western Blueprint Co., of Kansas City, Mo., is named the Gurley agent in Kansas and western Missouri. And the Wray Williams Co., of Memphis, Tenn., will cover the Tennessee and Arkansas territory.

Mo. Agent for Hydro-Line

Rogers & Baxter of 2013 Olive St., St. Louis, Mo., has been appointed a distributor by the Hydro-Line Mfg. Co., Rockford, Ill. The company will have exclusive rights in Missouri, Iowa, Nebraska, Kansas, Oklahoma, and the southern part of Illinois. Hydro-Line manufactures air and hydraulic cylinders and special machinery.

Canadian Agent for Davey

Ritchie Equipment Co., Ltd., of Vancouver, Canada, has been named a direct factory distributor for the Davey Compressor Co. It will provide complete sales and service facilities for all items in the Davey line. Other lines handled by the company include those of the Drott Mfg. Co., Forano, Ltd., The Dallett Tool Co., Atlas Engineering Co., Wettlaufer Industries, Craftools, and Canadian Construction Machinery Co. Ritchie headquarters are located at 205 W. First Ave. in Vancouver.

Kansas City Dealer Moves

The Contractors Supply Co. of Kansas City, Mo., has moved to new quarters at 1728 Walnut St. The company formerly was located at 1712 Main St. The lines it handles include those of La-Plant-Choate Mfg. Co., Inc.; Macwhyte Co.; Davey Compressor Co.; Independent Pneumatic Tool Co.; The B. F. Goodrich Rubber Co.; Novo Engine Co.; Sasgen Derrick Co.; Raybestos-Manhattan, Inc.; the M. R. C. Bearing Service Co., a Division of Marlin-Rockwell Corp.; Master Specialties Co.; the Alemite Division of Stewart-Warner Corp.; S. K. Wellman Co.; American-Marietta Co.; and The Lamson & Sessions Co.

Plow-Wax Dealers Wanted

A national dealer organization for the distribution and sale of Penn Drake snow-plow wax is being established by the Pennsylvania Refining Co. The wax is designed to provide a snow-repellent finish for plow surfaces. Dealers interested in handling it should write to the company at 2686 Lisbon Road, Cleveland 4, Ohio.

"Cat" Agent in Oregon

The Inland Machinery Co. of LeGrande, Oreg., has been named distributor of Caterpillar products in five eastern counties of the state of Oregon. These are: Baker, Union, Wallowa, Grant, and Harney. Inland is headed by Robert R. Carey as President, J. Donald Steinbeck and C. E. Millering as Vice Presidents, and W. Ned Jones as Secretary-Treasurer. Offices are located at 212 Greenwood St.

The five counties served by Inland were formerly served by the Bunting Tractor Co., which retains 19 counties of Idaho and Malheur County in Oregon as its territory.

J. F. Robbins Joins Capitol

J. F. Robbins has joined the Capitol Equipment Co., construction-equipment distributor of Harrisburg, Pa., as President and General Manager. He goes to Capitol from the Koehring Co., where he served as Sales Manager. He has also been connected with the C. S. Johnson Co. and the Kwik-Mix Co., both Koehring subsidiaries.

Working with Mr. Robbins is Wayne B. Titus, former partner of the N. A. Coulter Co., original company of the present firm. Other principals at Capitol are A. M. Elliott, in charge of office;

(*Concluded on next page*)

New 40-50-ton Low Bed Machinery Trailer

HUGHES

9'0" wide x 18'0" deck
Complete outriggers
16-825x15 Tires

Immediate delivery

Also 15, 20, 25, 30-ton semi or full

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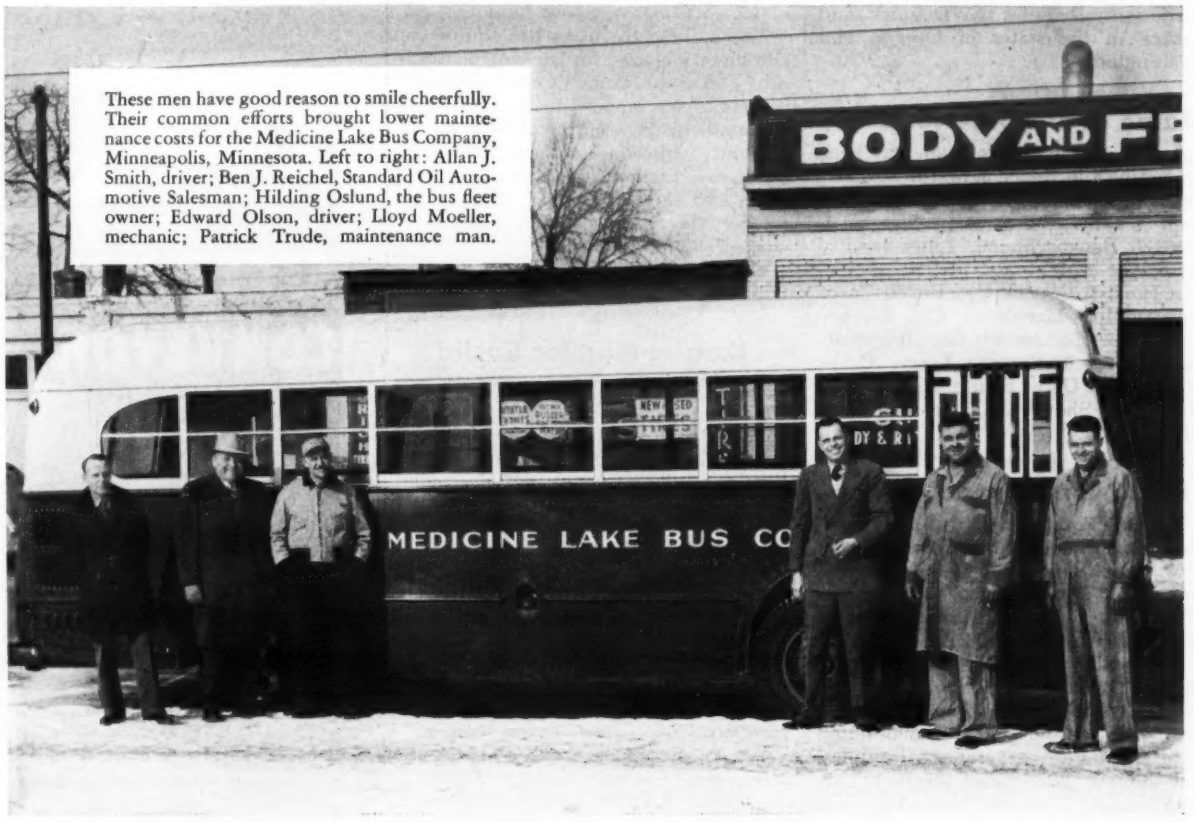
Phone: 7-1009



These men have good reason to smile cheerfully. Their common efforts brought lower maintenance costs for the Medicine Lake Bus Company, Minneapolis, Minnesota. Left to right: Allan J. Smith, driver; Ben J. Reichel, Standard Oil Automotive Salesman; Hilding Oslund, the bus fleet owner; Edward Olson, driver; Lloyd Moeller, mechanic; Patrick Trude, maintenance man.

Start-stop service and overload cause little trouble, now, with . . .

Stanolube HD Motor Oil

The Medicine Lake Bus Company, Minneapolis, Minnesota, is faced by two major operating problems: (1) a high ratio of bus starts and stops per mile, (2) heavy passenger loadings, amounting to 100% overload during peak hours. This severe service materially affects engine life.

Seeking to drive down maintenance costs, this fleet's management tried various conventional and heavy duty lubricants. Oil performance was closely observed. On the basis of the results, one lubricant was chosen over all others —Stanolube HD Motor Oil.

Mr. H. O. Oslund, the owner, writes: "In our experience, we found that engine life was materially extended. Such problems as dirty engines, ring sticking, bearing failure, and premature valve failures have been eliminated. In our opinion, 'Stanolube HD' has solved our lubrication problems."

Whatever operating conditions face your fleet—high temperatures, heavy loads, or continuous operation—you'll find "Stanolube HD" fortified to meet them. This heavy duty lubricant owes its superiority to the combination of effective oxidation-resistant and detergent additives with highest quality solvent-extracted base stocks. It assures cleaner and safer operation for your fleet engines.

If you are located in the Midwest, write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, for the services of the Standard Oil Automotive Engineer nearest you.

STANDARD OIL COMPANY (INDIANA) STANDARD

Distributor Doings

(*Continued from preceding page*)

Olin Hartinstine, in charge of parts and service; and R. K. Patterson and H. W. Brown, sales. The Coulter Co. has operated in the Harrisburg area since 1940. The company's name was changed last January when an expansion program was begun.

Feenaughty Honored by FWD

The Feenaughty Machinery & Equipment Co. was honored recently by The Four Wheel Drive Auto Co. on the completion of 26 years of sales and service dealership. Don Feenaughty, President of the company, and M. B. Mack, Vice President and Sales Manager, went to Clintonville to accept a plaque presented to the organization by Walter A. Olen, President of FWD. The presentation was made at a special banquet. Feenaughty handles FWD sales and service in the states of Oregon and Washington.

Maine Warehouse for H&M

A new warehouse location has been opened by the Hedge & Mattheis Co. in Veazie, Maine, on the Orono Road. The mailing address of the new location is Box 120, Bangor, Maine. Lines handled by Hedge & Mattheis include American Hoist & Derrick Co., Burch Corp., Construction Machinery Co., Electric Tamper & Equipment Co., Ingersoll-Rand Co., McKiernan-Terry Corp., Rogers Bros. Corp., Sauerman Bros. Co., The Thew Shovel Co., and Whiteman Mfg. Co.

Sacramento Branch Office

The Bay Equipment Co. of Richmond, Calif., has announced the opening of a new branch office and plant in Sacramento. It is located at 4945 Folsom Blvd., and is under the supervision of Harold E. Diggles. The Sacramento branch will carry the complete line handled by Bay Equipment Co., including Worthington compressors and air tools; Ransome truck and building mixers; Manitowoc cranes, draglines, and shovels; Wooldridge scrapers, rippers, power units, bulldozers, and Terra Cobras; White Mfg. Co. tar kettles, vibrators, and loaders; and the Warner & Swasey Gradall.

Tyson Names Two Dealers

Two dealers have been appointed by The Tyson Bearing Corp. of Massillon, Ohio. R. A. Rodriguez, Inc., 55 W. 42nd St., New York, N. Y., will represent Tyson in all foreign countries except Canada. C. J. Edwards, Inc., 2209 Fisher Bldg., Detroit, Mich., will represent Tyson in the automotive manufacturing and industrial fields throughout Michigan.

Ice-Control Procedures

The treatment of icy pavements is the subject of a committee report published by the American Road Builders' Association, 1319 F St., N. W., Washington 4, D. C. Technical Bulletin No. 145, 1948, contains the results of an open forum held at the Road Builders' Conference of the ARBA last January, and sponsored by the Committee on Treatment of Icy Pavements, Snow Removal, etc.

The bulletin discusses the equipment and materials used for ice control, planning and organization of crews, classifications of ice, and so forth. It covers in detail the physical characteristics of calcium chloride, sodium chloride, abrasives, cinders, sand, and washed stone and slag screenings. It also describes the treatment, handling, and storage of these materials.

Copies of the bulletin may be obtained by writing to the ARBA.

District Mgr. for Euclid

Thomas A. Cantrell has been appointed District Manager for western New York and the Canadian provinces of Ontario and Quebec by The Euclid Road Machinery Co. of Cleveland, Ohio. He was formerly a field engineer in the Sales Development Department.

Eaton Mfg. Co. Ups Winther

M. P. Winther was appointed Vice President and Director of Engineering at a meeting of the Board of Directors of Eaton Mfg. Co. He has been with the company since March, 1946, and will make his headquarters at the company's general offices at 739 E. 140th St., Cleveland, Ohio.

SLASH cleaning costs!

This Free Manual

can help you lower equipment servicing costs.

36 pages of money-saving service shop cleaning procedures you will want to know about! Time-saving ways to steam-clean motors and chassis . . . recondition clogged radiators . . . clean cooling systems . . . degrease parts before repair. And many other improved job-cleaning procedures. Write NOW for your FREE copy. No obligation.

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72 Thames St., NEW YORK 6, N. Y.
Technical Service Representatives Located in Principal Cities of United States and Canada

OAKITE MATERIALS METHODS SERVICE

Specialized Industrial Cleaning

"Cemco"

SECTIONAL CONVEYOR

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Shovel hoppers of two yard capacity can be quickly and easily installed.

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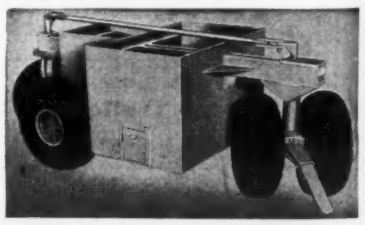

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Road Is Relocated; Three Bridges Built

Two Contracts Will Remove Bottleneck on U. S. 1 With 9-Mile Project; Holdover Pre-War Job in Maine

A 9-MILE stretch of U. S. 1 in Maine is being relocated to replace a dangerous alignment marked by hills and sharp curves, and a pavement too narrow for safety. The new construction begins at the north city line of Portland, at the upper end of the Martin Point Bridge, and continues northeast to a point beyond the village of Yarmouth. Two separate contracts comprise the project. One includes road work only—grading, base course, and surfacing. The other contract, at the upper or Yarmouth end, covers the building of three bridges—two grade separations and a river crossing. Work on the combined $1,264,809 project got under way in the summer of 1947, and is scheduled for completion this year.

U. S. 1 above Portland passes through the thickly settled communities of Falmouth, Cumberland, and Yarmouth. The 20-foot pavement, too narrow for the traffic it carries, winds along in an almost continual series of curves and sharply rising hills. Large old homes and big trees lie close to the highway, rendering practically impossible any widening or change of alignment except at prohibitive costs. Even before the war the Maine State Highway Commission recognized the need for abolishing this highway bottleneck. Plans were drawn to relocate U. S. 1 about ½ mile west of the existing 7-inch-thick concrete road.

The new design called for dual 24-foot pavements separated by a grass median strip 26 feet wide. Only one roadway was to be graded at the start, but the drainage structures were to be built for the full dual roadway. This preliminary grading was started early in December, 1941, just before the outbreak of war. Contractor J. R. Cianchette of Pittsfield, Maine, completed about 75 per cent of the work by September, 1942, when the war-induced shortages of men, materials, and equipment compelled the Highway Commission to terminate the contract.

Two Contracts

Last year the Maine State Highway Commission re-advertised the project calling for separate bids on the road work and the bridges at Yarmouth. Low bidder on the 9-mile road job was the M. DeMatteo Construction Co. of Quincy, Mass., whose contract price was $929,259.30. The two highway overpasses and the bridge over the Royal River went to Ellis C. Snodgrass, Inc., of Portland, Maine, on a low bid of $335,550.37.

For the first mile out of Portland the existing 20-foot concrete pavement is left undisturbed. However, plans call for a 13-foot strip of 8-inch concrete base course to be built on either side of it, and the full 46-foot width of concrete to be surfaced with 2 inches of bituminous concrete. A good foundation is being constructed for the concrete base course, consisting of first a 16-inch layer of sand, topped by 8 inches of gravel. The widened road will have a center crown of 7 inches. When the concrete is placed, the surface will be roughened with a broom to provide a better bond with the plant-mix surfacing.

To provide a bond between the lanes, 9-inch-deep holes are drilled on 3-foot centers along the sides of the original slabs at their mid-point depth. Into these holes are driven tie bars 36 inches long and ¾ inch in diameter, with one end split and a small wedge inserted. As they are forced in, the bars expand, thus locking themselves securely into the old concrete. The projecting 27 inches of bar will be embedded in the new adjoining concrete base course.

C. & E. M. Photo

A Gar Wood 12-yard scraper pulled by a Caterpillar D8 picks up a load of topsoil before grading begins on the reconstruction of U. S. 1 in Maine. The topsoil will be stockpiled and later spread on slopes.

The plans call for an 8-foot shoulder or parking strip on either side of the pavement, with 8 inches of sand as a base and 8 inches of gravel on top of that. The surface consists of a 2-inch layer of gravel pre-mixed with tar. The shoulders slope downward at the rate of ½ inch to the foot, with granite curbs at the sides.

(*Continued on next page*)

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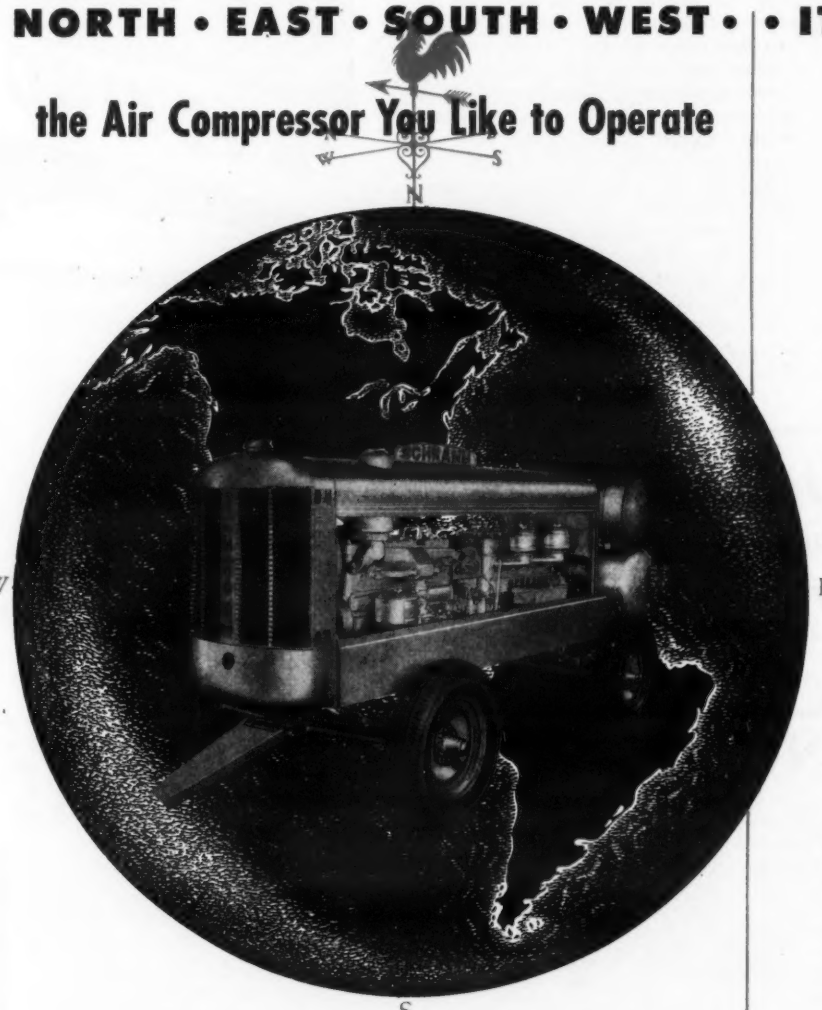

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C. & E. M. Photos
The Bucyrus-Erie 22-B ¾-yard shovel at left loads sub-base sand for the DeMatteo job into one truck while another takes up a position for loading on the opposite side. The D6 tractor-dozer above levels off the sand after it is tail-gated over the roadbed.

Road Is Relocated; Three Bridges Built

(Continued from preceding page)

New Location

At the upper end of this first mile, the new alignment swings west, leaving the old road and continuing on new location for 8 miles to a point above Yarmouth where it again ties in to the existing U. S. 1. Curves and sharp grades are practically eliminated on this alignment. For the present this stretch of road will consist of a 24-foot bituminous-concrete pavement with 10-foot gravel shoulders. Under the pavement is a sand sub-base from 15 to 22 inches thick, topped by an 8-inch gravel base course which extends out through the shoulders. Over the gravel is a course of crushed stone, 7½ inches thick, and bound together with sand. This will serve as a foundation for the plant-mix pavement to consist of a 2-inch binder course followed by a 1-inch wearing course.

In the cuts the slopes are 2 to 1. In fills under 10 feet high, the slopes are 4 to 1; on higher fills they are 1¾ to 1, and have a protecting guardrail.

Last year the road work consisted chiefly of grading, installing drainage pipe, and laying the sand sub-base. By getting this sand in place before the job shut down for the winter, the contractor had pretty well stabilized the roadbed so that construction might be resumed early in the spring without being bogged down. This year the gravel and crushed-stone courses were scheduled to be placed and the pavement completed.

For about 5 miles on one side along the edges of the pavement, a line of 6-inch asphalt-coated perforated-metal pipe has been laid. Trenches 4 feet deep below subgrade and 24 inches wide were dug for the pipe by a Bucyrus-Erie ¾-yard drag shovel. The backfill consists of clean, fine gravel graded from coarse sand to 1½ inches.

Grading

The bulk of the heavy grading was done six years ago in the original contract which constructed fills up to 30 feet in height, and dug cuts as deep as 18 feet in the marine-clay stratum of this down-east coast line. About 20,000 cubic yards of ledge rock had also been excavated in 1942. But about 55,000 yards of dirt was still needed

(Continued on next page)

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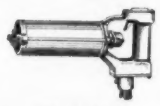

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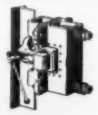

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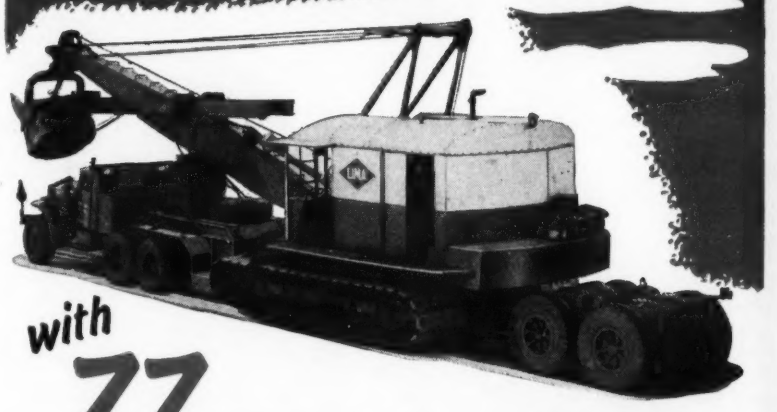

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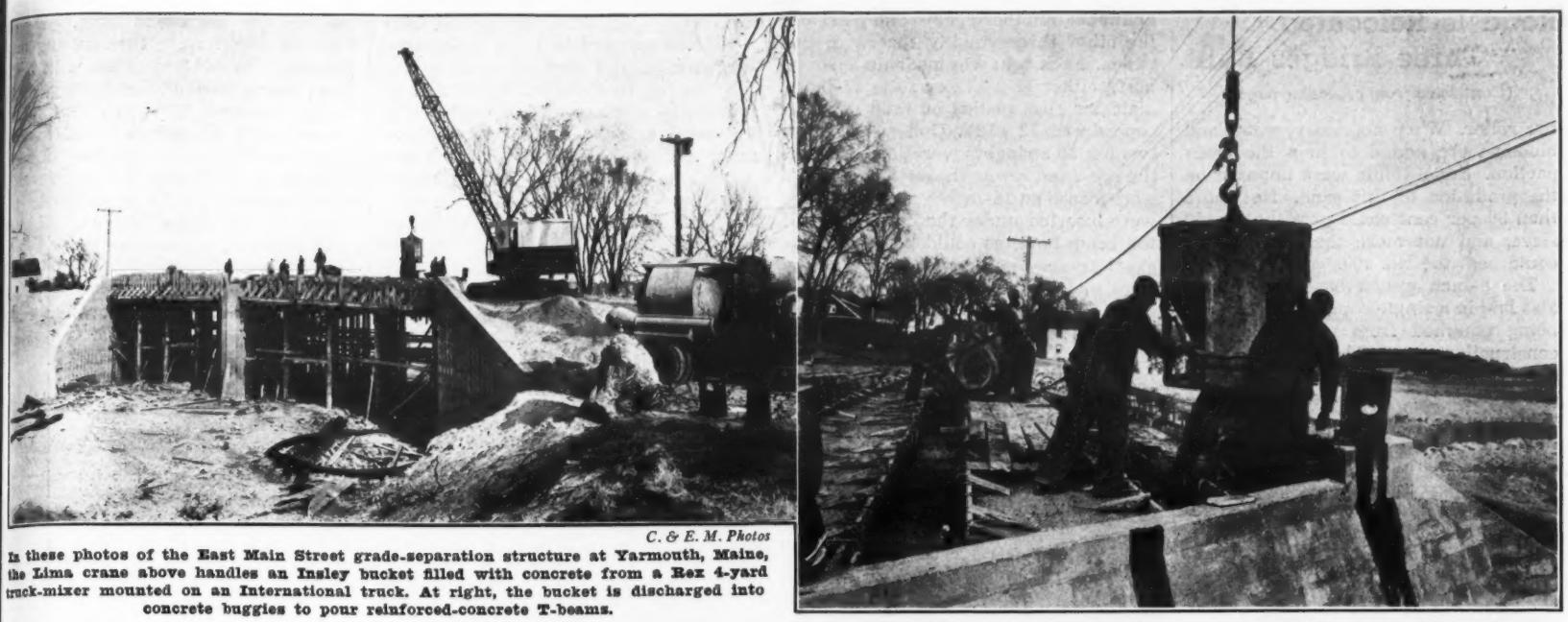

C. & E. M. Photos

In these photos of the East Main Street grade-separation structure at Yarmouth, Maine, the Lima crane above handles an Insley bucket filled with concrete from a Rex 4-yard truck-mixer mounted on an International truck. At right, the bucket is discharged into concrete buggies to pour reinforced-concrete T-beams.

to complete the embankments.

This borrow was obtained from three roadside pits not far from where the material was needed so that the average haul was only 2,000 feet. Both a Northwest 2-yard and a Link-Belt Speeder shovel worked the pits, loading to a fleet of 4-yard trucks which were hired by the hour. All told, about 32 hired trucks were used either on the grading, or to haul sand, gravel, or stone. The contractor also used two of his own 12-yard bottom-dump Euclids and one 10-yard end-dump Euclid on the borrow hauls. Three Bucyrus-Erie 22-B ¾-yard shovels were also used either on the road excavation or in the pits.

The fills were spread in 12-inch loose layers by three Caterpillar D8 tractor-dozers, and were compacted by a combination of the hauling and spreading machinery. Shaping was done by a Caterpillar No. 12 motor grader. With two shovels working, the average amount of borrow that was placed in a 9-hour day totaled 2,200 cubic yards.

During the interim between the original construction and the present contract, large portions of the roadbed had grown thick grass and bushes. Grubbing out these overgrown areas and removing the topsoil was done with a Gar Wood 12-yard scraper pulled by a D8 tractor. The topsoil was stockpiled and later spread on the slopes.

Sand Sub-Base

Sand for the sub-base was obtained from a pit near Cumberland, about 6 miles from the center of the job, where it was excavated by the shovels and loaded into trucks. One shovel averaged about 1,000 yards in a 9-hour day. The sand was tail-gated over the roadbed and spread in a single layer, 15 to 22 inches thick, by a D6 tractor-dozer. After being spread, the surface of the sand was rolled by a rubber-

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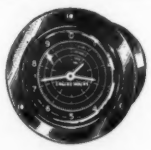

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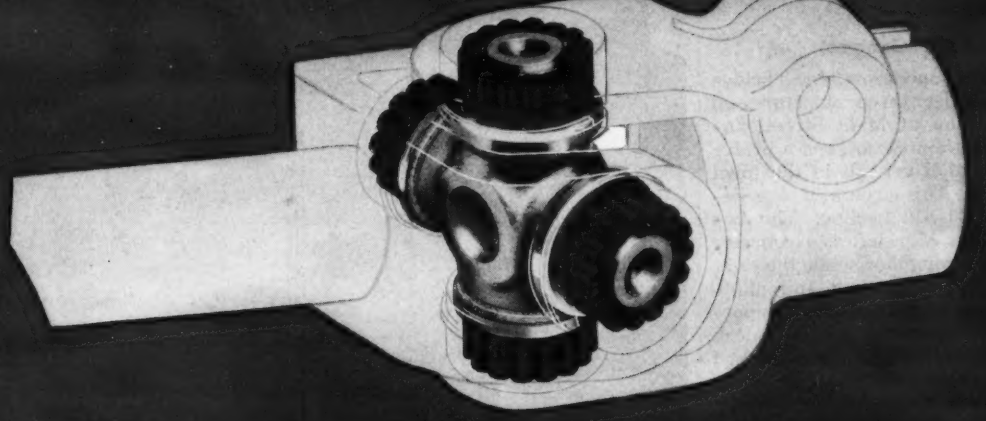

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Road Is Relocated; Three Bridges Built

(*Continued from preceding page*)

tire roller. When necessary, water and binder were added to help the compaction. Some limits were imposed on the gradation of this sand. Not more than 30 per cent could pass the No. 50 sieve, and not more than 8 per cent could pass the No. 100.

The 8-inch gravel base course was also laid in a single course, the material being obtained from pits within the construction area. The 7½ inches of crushed stone that went on top of the gravel was laid in two courses. The voids were filled with stone dust and sand, after which the surface was broomed and rolled in preparation for the asphaltic-concrete pavement.

The gradation of the crushed stone used in the pavement foundation was:

Passing 3-inch sieve	100 per cent
Passing 2-inch sieve	0-15 per cent
Retained on ¼-inch sieve	100 per cent

Quantities and Personnel

The major items in the road contract include the following:

Excavation	103,000 cu. yds.
Sand base course	78,000 cu. yds.
Gravel base course	63,000 cu. yds.
Crushed-stone base course	24,000 cu. yds.
Cement-concrete base	3,000 cu. yds.
Steel reinforcement	50 tons
Tar for shoulders	25,000 gals.
Bituminous concrete	23,000 tons
Metal underdrain, 6-inch	28,000 lin. ft.

M. DeMatteo Construction Co. employed an average force of 70 men under the direction of Frank Tupper, Superintendent. For the Maine State Highway Commission, Lawrence Murphy was Resident Engineer.

Bridge Contract

The Ellis C. Snodgrass, Inc., bridge contract includes three structures—a grade separation at Main Street, another at East Main Street, and a bridge over the Royal River, all in the town of Yarmouth. The structures are designed for H20-S16 loading. The two overpasses are of reinforced-concrete construction throughout, while the river bridge has concrete piers and abutments with a structural-steel superstructure to support a concrete deck slab. All three bridges were worked on last year, but only the East Main Street span was finished before winter. The other two structures will be completed this season.

U. S. 1 passes over Main Street on the first grade-separation structure, crosses the Royal River on the new bridge, and then drops down to go under the East Main Street span. Just north of the last bridge the new location swings back to rejoin the existing stretch of U. S. 1. These bridges eliminate a traffic bottleneck in Yarmouth.

East Main Street Span

The bridge which carries East Main Street over the newly located U. S. 1 is 100 feet long with two 50-foot spans supported on concrete abutments and a center pier. It is on a 48-degree 17-minute skew, and provides a vertical clearance of 14 feet. No piles were required as the footings rest on hardpan. Abutment 1 is 125 feet long and abutment 2 is 115 feet long including wings. Under the abutments are 3-foot-deep footings. The abutments are 23 feet high, measured from the bottom of footings. The pier is about the same height, rests on a 3-foot-deep footing, and tapers from 6 feet in width at the bottom to 4 feet at the top.

The superstructure consists of seven reinforced-concrete girders, all 2½ feet deep, with the two outside girders 1½ feet wide, and the inner girders 1 foot 11¼ inches wide. They support the 6¼-inch deck slab for the 27-foot roadway which has a 4-foot sidewalk on one side.

Form work for each of the 50-foot deck spans was supported on falsework consisting of five bents—one against the abutment, another against the pier, and the other three equally spaced in between. Each bent was made up of seven posts, either 12 x 12's or 10 to 12-inch-diameter piles resting on mud sills and capped with 12 x 12's. Under each beam two 6 x 10 stringers were laid between the caps, and across the stringers 2 x 6's were placed on 18-inch centers. Wedges were inserted under the 2 x 6's so that the beam bottoms could be brought to exact grade. The deck and beam forms were made from 1¼-inch stock. Most of the form lumber was cut on a Beach table saw.

Truck-Mixed Concrete

Reinforced steel for the bridges was purchased from Bancroft & Martin Rolling Mills Co. at South Portland, and delivered to the job by truck. The concrete was supplied by Cook & Co., Inc., of Portland, and was delivered to the job site in Rex 4-yard truck-mixers mounted on International trucks. The average haul was 10 miles. Darex air-entraining agent was added to the mix at the rate of 1 ounce per bag of cement to make the concrete resistant to freezing and thawing cycles. This amount resulted in from 3 to 6 per cent air entrainment.

For mass concrete the specifications called for 5.2 bags of cement per yard of concrete, and the weights for a typical 6-bag batch were as follows:

Cement	564 lbs.
Sand	1,200 lbs.
Stone, 1¾-¼-inch	2,460 lbs.
Water	40 gals.

At the job site the truck-mixers discharged the concrete into Insley 1-yard buckets which were then swung over the forms by a Lima crane with a 65-foot boom. From the bottom-dump bucket the concrete was either placed directly into the forms or discharged into buggies which were then dumped as needed. The buggies were generally used in pouring the beams. As the concrete was placed it was vibrated with a Viber pneumatic vibrator driven by a Chicago Pneumatic 110-cfm portable air compressor. Water from the town hydrants was used to cure the concrete.

Main Street Bridge

The new U. S. 1 crosses Main Street on a 170-foot bridge composed of three

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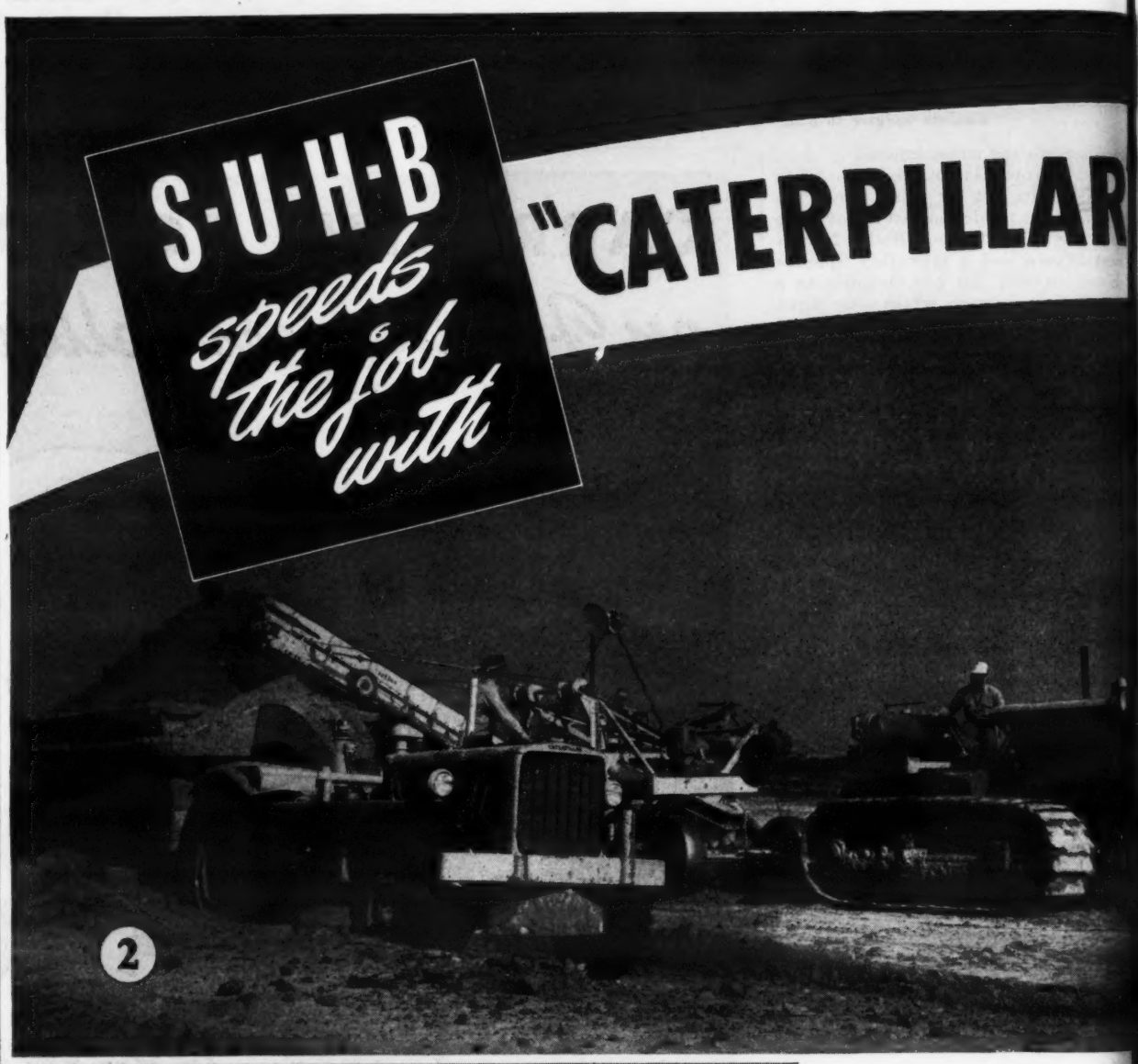

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spans of 50, 70, and 50 feet. As the abutments are up on high approach fills, they are supported on two rows of steel H-piles, 22 piles to the abutment. The piles are 40 feet long and have a load of 34 tons each; they penetrate 1 foot into the concrete. The two piers are about 18 feet high and rest on 70 x 6 x 3-foot-deep footings. The vertical clearance is 14 feet, while the 56-foot roadway consists of two 26-foot lanes separated by a 4-foot median strip.

The superstructure consists of ten reinforced-concrete girders, 1 foot 9¼ inches wide but of variable depth according to their parabolic curve. The depth of beams ranges from 1 foot 9 inches to 4 feet 6 inches. They support a 6½-inch concrete slab which will be topped by 2 inches of bituminous concrete.

Royal River Bridge

Over the Royal River the new bridge measures 244 feet 11 inches, center to center of abutment bearings; it has three spans slightly over 80 feet each. The two piers in the river, which rest on ledge, were built first, followed by the abutments on the banks which are supported on steel H-beam piles driven to ledge. These piles are 12-inch 53-pound beams, 30 to 35 feet long, while those in the Main Street overpass are lighter, either 10-inch 42-pound or 8-inch 36-pound. All were supplied by the Bethlehem Steel Co. In these river-bridge abutments the piles were driven in two rows, 10 in the front row and 8 in the back, both rows on a batter. They project 3 feet into the concrete. Driving was done by a Union No. 2 air hammer powered by a Chicago Pneumatic 4¾ x 5 air compressor, and handled by a Koehring 304 crane with a 50-foot boom.

The abutments are 70 feet long x 7 feet wide x 10 feet deep. The footings for the piers are 71 x 5 x 7 feet average depth, according to the plane of the ledge. From the footings the piers rise to a height of 21 feet, battering in ½ inch to the foot to measure 58 feet long x 5 feet wide at the top.

The river piers were constructed from floats made by bolting together 6 x 6 x 5-foot-deep pontoons. Six of these pontoons provided sufficient area, 18 x 12 feet, to float the crane which drove the sheet piling for the cofferdams. A timber framework was built first of double 12 x 12's, held 3 inches apart, through which the wooden 3-inch tongue-and-groove sheeting was driven. This framework was floated into position and held there by guys or anchors. Wooden sheeting 18 to 24 feet long was driven through the shallow layer of soft bottom material to the rock. The northern abutment and the two piers were poured from the north bank, using two pontoons and two cranes. To reach the farthest pier, the bucket was picked up from the shore by the first floating crane and swung over to the second floating crane which deposited it in the forms.

Underwater 1-yard buckets were used for the seal pour with the mix richened to 7 bags per yard. The sheeting served as a form for the seal. Then the cofferdam was unwatered with an 8-inch pump, and forms were built for the footings and stems. Most of the form work was 1¼-inch stock backed by 2 x 6 studs on 16-inch centers, and double 2 x 6 wales on 3-foot centers. The forms were tied together by Richmond Tyscrus on from 2½ to 3-foot centers.

Steel for the superstructure was supplied by the American Bridge Co. and consisted of ten WF 36-inch 230-pound beams for each span. The concrete deck is 6½ inches deep and will be topped by 3 inches of bituminous concrete. The roadway has two 26-foot lanes separated by a 4-foot median strip which is raised 6 inches. On each side is a 2½-foot sidewalk and a 3-foot railing of concrete posts and wrought-iron pipe rails.

Quantities and Personnel

The major items in the bridge contract include the following:

Concrete	4,517 cu. yds.
Reinforcing steel	396,500 lbs.
Structural steel	653,000 lbs.
Steel H-beam piles	5,750 lin. ft.

Ellis C. Snodgrass, Inc., employed a force averaging 40 men under the direction of Superintendents G. F. Salsbury and Wallace Libby. For the Maine State Highway Commission, Andrew Adams was Resident Engineer. The Commission is headed by Lucius D. Barrows, Chief Engineer, with Max L. Wilder, Bridge Engineer, and Ernest L. Merrill, Principal Highway Engineer.

Weed-Killing Chemicals

Information on the use of its chemical weed killers has been issued by the Monsanto Chemical Co., Organic Chemicals Division, 1700 S. 2nd St., St. Louis 4, Mo. The booklet discusses the various types of weeds, illustrates their physical characteristics, describes the ways in which they make nuisances of themselves, and explains how the Monsanto chemicals go to work on them.

The pamphlet describes the formulations of the Monsanto weed killers—Santophen 20, Santobrite, and 2, 4-D. It tells how these chemicals work and how they are applied. It covers the steps to be followed to achieve the most good from the chemicals, and also lists abstracts from the North Central Weed Control Conference on acceptable uses and dosages of weed-killing chemicals. Monsanto maintains a consultation service for contractors and engineers interested in clearing right-of-ways, ditch banks, roadsides, etc., and this service is described in the bulletin.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 114.

Manager for Saw Company

Burleigh Owens has taken over the management of the Chicago branch of E. C. Atkins & Co., manufacturer of saws and machine knives. He formerly handled Atkins affairs in the territory including southern Indiana, northern Kentucky, and central Ohio.

ZONED EQUIPMENT

Numbered are the days when important earthmoving projects will still be undertaken with poorly matched machinery. "Caterpillar" Zoned Equipment—specially designed to work in unison—has set new standards of construction speed that make successful bidding against it no easy matter.

Take the case of Stolte & United Concrete-Harrison & Bell ("S-U-H-B"): Working on a 960-day completion contract, their handling of a 4,800,000-yard "slice" of California's Central Valley Project brought into action "Caterpillar" units that include D8 and D7 Tractors with bulldozers for leveling and push-dozers for scraper loading; a fleet of DW10 (wheel-type) Tractors and W10 Wagons for fast, long hauling from dragline and "Caterpillar" Elevating Grader; a No. 12 Motor Grader for building and maintaining haul roads. "Every day a big-capacity day!"

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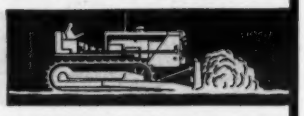
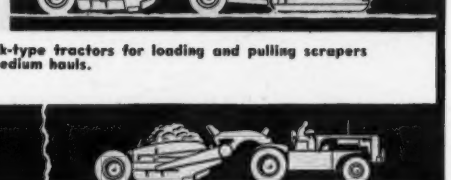
"Caterpillar" builds units you need to zone equipment for *lowest costs on earth:*



1 Track-type tractors for "push"-distance earthmoving.



2 Track-type tractors for loading and pulling scrapers on medium hauls.

3 Wheel-type tractors for high-speed long hauls (with scrapers or wagons) — plus motor graders for finishing and haul-road maintenance.

1

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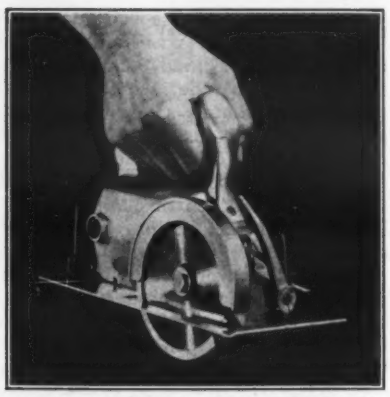

Dadoing, cutting tenons, grooving, and notching are handled by the Porter-Cable improved Model A-4 electric Guild saw. It weighs 6¾ pounds.

Electric Hand Saw

An improved model of the 4½-inch Guild saw is in production, announces the Porter-Cable Machine Co., 1805 Salina St., Syracuse 8, N. Y. According to the manufacturer, the Model A-4 can be used for dadoing, cutting tenons, grooving, and notching operations; it can be tilted to 45 degrees for bevel or compound-miter cut; it can be raised or lowered into the work; and it has an adjustable ripping guide. The blade guard is said to protect the blade at every angle, leaving the teeth exposed only where actually cutting.

The saw has a 1¼-inch capacity on straight cutting, or 1-inch at a bevel of 45 degrees. The saw blade is 4½ inches in diameter and is driven by a universal motor operating on 110 volts, ac or dc. The unit is 10½ inches in length, 4½ inches in width, and 8 inches in height. It weighs 6¾ pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 91.

V-Type Rotary Snow Plows

Two bulletins on the Snow King truck-mounted rotary snow plows are now available from The Rotary Snow Plow Co., 1611 Central Ave., Minneapolis 13, Minn. Bulletin No. 1119 describes the Model 72; Bulletin No. 1121, the Model 883. Both units are designed for mounting on 4-wheel-drive trucks with a capacity of 5 tons or more.

Features listed for the Model 72 include clear vision for the operator, reversible discharge chute, and deflecting plates. The bulletin describes each of these in detail and gives specifications covering the rotor, the clearing width, the dimensions of the unit, etc.

Bulletin No. 1121 lists six features claimed for the Model 883—speed, action, control, balance, power, and protection. Specifications cover dimensions, capacities, etc. Also described are the moldboard, rotors, plow transmission, chutes, slicer blades, and the auxiliary engine.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 50.

Steam-Detergent Cleaning

A report on steam-detergent methods for cleaning equipment is contained in a recent issue of the "Oakite News Service", house publication of Oakite Products, Inc., 172 Thames St., New York 6, N. Y. The article discusses clean-up routines and features a description of the equipment used and its installation.

The article explains the system, with its simultaneous application of heat, steam pressure, and a detergent solution. It lists the equipment and supplies needed and tells how to set them up. The article is illustrated to show the equipment in use cleaning machinery and in paint-stripping operations.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 109.

Fabric Conveyor Belt For High-Tensile Use

A high-tension fabric conveyor belt has been developed by the Hewitt Rubber Division of Hewitt-Robins, Inc., 245 Kensington Ave., Buffalo 5, N. Y. Known as Raynile, it is recommended by the manufacturer for use on jobs where belt tensions run as high as 1,000 pounds per inch of width. It is made from a combination of rayon and nylon.

Among the features claimed for Raynile are maximum tension, transverse flexibility assured by the nylon transverse threads, minimum stretch in actual operation, and easy field splicing because of the fabric construction. The Raynile fabric belt is reinforced by plies of rayon and nylon fabric suitably bonded to each other. The top cover is said to be securely bonded to the carcass by a shock-absorbing and distributing cord breaker.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 64.

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With the exclusive Oliver "Cletrac" steering principle, the tractor-dozer unit cuts your clearing time to the minimum. There's always power on both tracks for biggest load-handling ability. You can speed up one track, slow down the other to offset the side pull of an off-center load. Time-wasting, power-wasting jackknifing is eliminated. And with constant two-track power, operation on hills and slopes is safer.

Oliver "Cletrac" steering lightens the load of front-end loaders, too. There is no undue strain of tractor frames or steering mechanisms. This Oliver "Cletrac" loader is a fast-acting unit that really makes dirt fly! Controlled "tip-up" bucket prevents spillage of loose material. And, since there's no excess weight on the front of the tractor, lifting capacity is materially increased.

Why not have your Oliver "Cletrac" dealer show you how this hard-working "team" can speed your jobs?

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Maps Help Spot Road Routes and Locations

Full Use of All Maps Available—Especially Aerial Maps—Will Speed Routing and Locating

By THOMAS C. COLLIER, Engineer of Road Design, Texas State Highway Department

FROM earliest times, man has regarded maps as indispensable to exploration, navigation, the waging of war, treasure seeking, empire building, the selection of trade routes, and many other pursuits. His maps vary in scale, from the astronomer's chart of the heavens to the site plan of a building; in refinement, from the crude drawing on the cave dweller's wall to the wonderfully accurate and complete maps of today. So many and varied are the maps of today, in fact, that we must narrow our discussion at once to the maps that most concern us—those that help us select the most suitable route and location of roads.

Route and Location

Since we frequently encounter confusion as to the meanings of "route" and "location", it may be of advantage to state a distinction that, while admittedly somewhat arbitrary, has fairly general acceptance when applied to road building. The determination of a *route* is based on factors affecting the service which the completed road is expected to render traffic. It is never finite, therefore, but is a relatively broad strip connecting the state objectives or control points. The ideal *location* is that line within the route "strip" that will best and most economically serve the purposes of design. Manifestly the route must be chosen before location is undertaken, although it may become necessary later to modify it. In sparsely settled areas, the route strip may be several miles wide, while in highly developed urban and suburban areas, route considerations may practically dictate location.

It is not unusual to find route and location considerations in opposition. In such cases it frequently happens that one or the other sways the road builder unduly. Most engineers have observed cases where directness for the sake of the route has been obtained at a cost impossible to justify. Cases where route principles have been violated for the sake of economy in location are not so apparent, but they are numerous. It should be evident that the road builder must be constantly alert to the need for serving the interests of both route and location. And we know of no better way to keep aware of all factors than by constant reference to maps of the region being studied.

During the reconnaissance and initial route study, it is most advantageous for the engineer to familiarize himself with the general topographic and geologic features of the area to be traversed; its basic economic features; the origins, destinations, and patterns of the traffic; and the relation of the project to the connecting and adjacent highway system. Much of the needed data can be obtained from available published maps. Naturally, such map study must be supplemented by field investigations. But during reconnaissance and route study, field investigations are primarily to verify and possibly to enlarge upon the information obtained from existing maps.

Maps Aid Route Study

Some of the maps helpful to the engineer at this stage of work are listed here, with comments as to content:

1. U. S. Coast and Geodetic Survey Maps: These are published primarily for navigational use and are particularly useful in the development of highways in the coastal area or in the vicinity of major rivers. They usually show only a strip of topography adjacent to the waterway, varying in width from 5 to 20 miles inland in the coastal areas. Contours are not shown, but practically all topography is plotted with reasonable accuracy.

2. U. S. Army Grid-System Maps: These are prepared for strategic areas; they combine the features of the U. S. Coast and Geodetic Survey maps, and the U. S. Geological Survey maps. They include contour intervals based on multiplex projection from aerial maps. Both natural and man-made topography is shown. They have been found to be unusually accurate and extremely useful in highway work.

3. U. S. Geological Survey Maps: These are probably the most widely known and most extensively used of all available topographic maps. Valuable

(*Continued on next page*)

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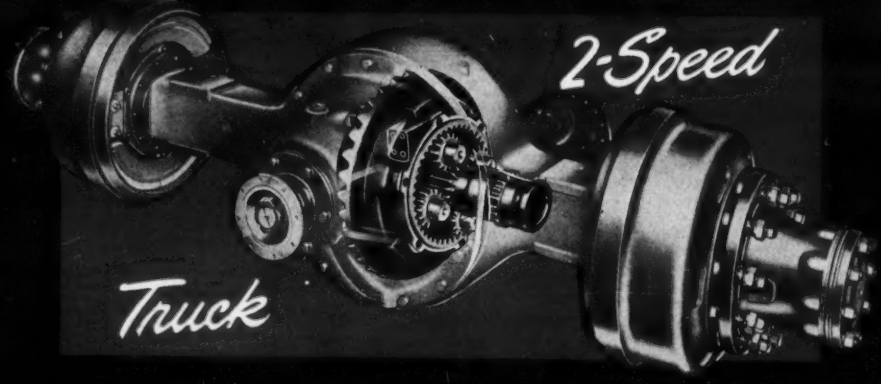

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CLEVELAND, OHIO

Maps Help Spot Road Routes and Locations

(Continued from preceding page)

information is shown as to the relative positions of roads, railroads, cities, towns, streams, etc., as well as relief features by contour lines. These maps are prepared in quadrangles, and where coverage is available maps can be obtained of any area of any given size or direction. An index map showing coverage can be obtained from the U. S. Geological Survey, Washington, D. C.

4. State-Wide Planning Survey Maps: These are prepared in accordance with nationally adopted specifications by individual state highway departments, and vary only in minor degree to fit the individual state's practices. Maps have been prepared for each county on two scales: 1 inch equals 2 miles, and 1 inch equals 1 mile. They show all existing public roads from the highest type of artery to the lowest type of unimproved trail. Topographical information, both natural and man-made, is complete with the exception of contours. All rural buildings, such as homes, churches, schools, etc., are shown and greatly benefit the engineer in determining the derivation of traffic. The county base maps are supplemented by inserts showing on a larger scale communities, villages, and towns, with separate maps for the larger cities and contiguous areas.

The Planning Survey also has county traffic maps similar to the general highway maps, which show for all roads and highways the latest average traffic count of vehicles per day. Counts are shown at critical points, such as junctions and intersections, and at such other points as show decrease or increase of traffic volumes served. For studying possible routes over a long distance between major control points, the county traffic maps are especially helpful, since they show the build-up of the traffic stream from the many feeder roads. In addition, a state traffic map portrays the traffic volumes served by the state-designated highways only. In an area of flat or fairly level terrain, where contour data are not vital, the Planning Survey maps supply the route engineer with a complete reference source to supplement actual field reconnaissance and survey work.

If the selection of a route is complicated by unknown traffic factors, such as percentage of through traffic, probable interchange at major junctions and intersections, destination points within large municipalities, etc., the Planning Survey is prepared to make an origin and destination survey and prepare for the engineer a traffic-flow map which will remove most guesswork concerning traffic movement. Information in these surveys is obtained from actual interviews with a certain proportion of drivers. The resulting data are authentic and considered a sound basis for determining the routes, particularly through and adjacent to urban areas.

5. Aerial Maps: There is no better mapping aid to the highway engineer than aerial photogrammetry. The value of aerial survey maps has apparently not yet been fully appreciated by the average engineer or they would be more widely used. But enough work has been done to establish the fact that they are of inestimable help. Aerial mapping is not merely the taking of pictures and matching of photographs to give a picture of the area desired. Actually it is a science for developing maps comparable in accuracy to maps developed by exhaustive field survey, giving a greater wealth of detail than could ever be obtained by field studies. And all of this can be accomplished at a small fraction of the cost of any other known method.

A great part of the country has been covered by previous flights. From these, satisfactory mosaics, with contact prints for stereoscopic study, can be obtained at a minimum cost for reconnaissance and route studies. However, the date of flight, height of flight, and type of camera used, limit the value of maps from previous flights. In areas of recent high development or in terrain where large-scale maps are desirable, it is preferable to secure new flights according to the proper specifications in order to find the best solution to the problem in hand.

For studies of physical conditions that may affect route, a controlled mosaic for an overall picture between control points, and contact prints for three-dimensional study at critical points, will eliminate many days of arduous field study. Critical points such as stream crossings, saddles, areas of bad drainage, etc., can be observed and marked for subsequent field study. Large-scale aerial maps are particularly useful in providing a basis for estimating property damage in built-up areas—more about that later.

Upon selection of a route between major control points, it is the usual practice to prepare a route map, ordinarily on a scale of 1 inch equals 1 mile, to portray the route in respect to major topographic features. The project for immediate construction may be only a minor part of the overall mileage, and the route map is recorded for future guidance as additional increments develop. The use of Planning Survey maps as a base generally will result in a very satisfactory route map, especially in rural areas.

Location Mapping

When route studies are completed, the project enters the location stage. There work falls into several phases: (1) preliminary investigations and surveys, during which detailed information

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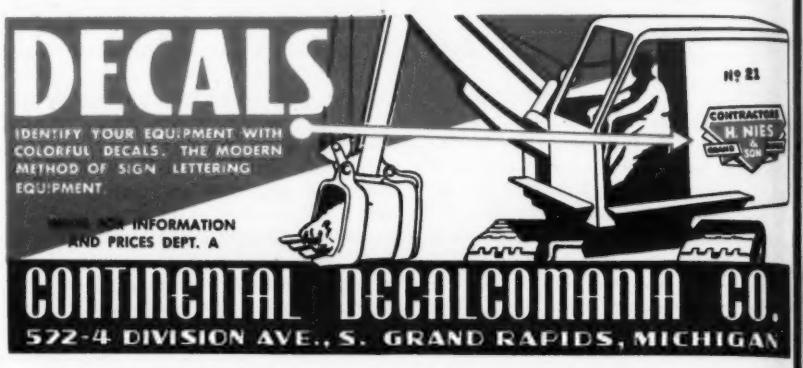
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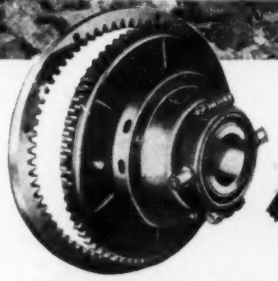
Four Twin Disc Model CL Clutches are used on the new Osgood Type 5, Model 50 Shovel equipped with ¾-yd. bucket. Two of the CL Clutches are on the reversing shaft, and two on the boom hoist.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Maximum performance . . . minimum space

Some construction jobs call for small yet rugged equipment . . . equipment built to work fast and hard in cramped space.

Answering this need, construction equipment manufacturers have produced tough, little shovels, designed and engineered to meet the job requirements. Into these machines, manufacturers have put Twin Disc Model CL Clutches, because this friction clutch is built to give maximum performance in minimum space.

For requirements limited by space, Twin Disc Model CL Clutches are built with one, two and three friction plates . . . sizes from 5.5″ to 11.5″ . . . and are designed to transmit loads of from 1.5 to 19.5 hp per 100 rpm. Maximum bore sizes are available to accommodate oversize shafts.

Providing single-point adjustment, plus extreme ease in engagement and disengagement, Model CL Clutches are supplied with gear tooth drive for easy assembly. Readily attachable driving rings are available for use with flywheels, drums and pulleys, For complete specifications, write for Bulletin No. 120-C. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).

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is obtained on topographic features which control or influence the location; (2) mapping the results of phase one and studying and selecting tentative and trial locations; (3) staking the trial location or locations with such modifications as are apparent; (4) plotting the selected location on plan and profile, and studying alignment and gradients in reference to contour data to determine possible refinements to fit the terrain better.

In the location stage, we turn to aerial mapping as the primary means of securing complete and accurate topographical detail at a minimum cost. Without aerial maps the locating engineer may stake any number of trial locations before finding the best one. Public interest may become excited and a difficult problem made all the more difficult. If advantage is taken of aerial surveys, the photographs themselves, on a scale of about 1 inch equals 1,000 feet, may be all that is necessary to pin-point the final location in flat and level country. In rough terrain, from photographs on a scale of 1 inch equals 200 feet, accurate topographic maps can be prepared. The aerial maps are prepared based on horizontal control obtained to the refinement desired. By use of vertical control and any of the approved contour-finder methods, contours can be plotted to almost any required accuracy.

The resulting map information will permit evaluation of land use, size and number of bridges, probable right-of-way needs, drainage conditions, soils, and coordination with the existing road system. Preliminary location lines can be laid out to fit the topography in alignment and profile. Comparative estimates of costs can be prepared, accurate enough so that the comparative advantages can be weighed. The best possible map location on the chosen route can now be projected, ready for a "fitting" by staking on the ground.

Upon completion of the field location survey, all facts pertaining to or influencing the location are plotted in plan and profile on tracing in continuous roll. Property ownership and right-of-way acreage is shown. All topography within a short distance on either side of the location is shown. Tentative grade lines are laid, and earth-work quantities and bridge costs are estimated. The location map acts as medium for storing all factual data pending the preparation of construction plans, and for use in right-of-way negotiations.

Aerial Maps for City Location

Location in the larger municipal areas for the purpose of developing arterial streets and freeways is a relatively new problem. In the past it has been the practice to take existing streets and highway entrances and try to provide expanded street facilities within the available right-of-way, with minor straightening of curves and increase of sight distances. But with the congestion caused by strip development, which is experienced along all highways approaching a city, and the increase in traffic volumes beyond all early expectations, it has become necessary to depart radically from old practices and seek new locations for development of expressways and arterial streets of modern and safe design.

Routes can often be developed which by-pass the more developed areas of the cities. But where the facility is to serve primarily traffic destined for points within the city, locations must be developed, possibly diagonal to the existing street system, at an extremely high cost in property damage. In cases of this kind, topography as relates to the works of man becomes the important factor governing location. With the great expansion experienced by our cities during the past few years, very little value can be obtained from existing maps. Again it is the aerial map which we must use for the latest and most up-to-date information. City maps will give data on zoning and dedicated street widths, but only the aerial map will depict the homes, buildings, railroads, factories, etc., which must be considered individually in the study of possible alternate locations.

Perhaps one of the greatest values of aerial maps in city work is their use in selling the general public on what otherwise might become an extremely controversial route. Oblique or vertical views, with the artist's conception of the finished facility superimposed on them, frequently can do a better job of selling than all the facts and statistics of a lengthy engineering report. Truly one picture is worth 1,000 words.

Maps that we now have, valuable as they are, are probably just a forerunner of what is to come in this field. Road builders will do well to keep in closest touch with new developments in mapping techniques and avail themselves of the constantly improved products of the map maker's art and science.

From a report of the Subcommittee on Maps, of the Committee on Highway Location, Surveying and Mapping, presented at the 45th Annual Convention of the American Road Builders' Association, Chicago, Ill.

Line of Belt Conveyors

A catalog on belt conveyors has been brought out by the New Holland Mfg. Co., a division of the New Holland Machine Co., Mountville, Pa. Entitled "Your Best Booster", the catalog features pictures and diagrams showing the adaptability of the New Holland belt conveyors. These are made in 8, 12, 16, and 20-foot sections and in widths of 18, 24, and 30 inches. Widths of 36 and 42 inches are available on special order.

Bulletin No. 900 contains six tables providing technical information on the capacity of the various belts according to weight and size of materials; horizontal horsepower requirements according to capacity in tons per hour and length of conveyors; horsepower required to lift loads vertically; horsepower ratings of American reduction units; and horizontal and vertical distances at various angles of incline.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 80.

It means higher production capacity and increased profit potential!

Compare before you buy any earthmoving equipment. Compare original price—weight—mobility—speed—power—and production. On every point you will see why LaPlant-Choate Motor Scrapers produce more yardage at the lowest possible cost. Then you will know why more and more contractors are switching to LPC Motor Scrapers. Best of all — you can get prompt delivery, too.

Now is the time to get ahead of your competition—change to rubber-tired scraper hauling units. See your nearest LPC distributor and let him show you why the Motor Scraper is tomorrow's tool for today's job.

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COMPARE	LPC MOTOR SCRAPERS	TRACK TYPE UNITS
Production yards per hr. 1,000′ one-way haul	156 yards	50% less
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HIGH-SPEED EARTHMOVING EQUIPMENT

Olympus Dam Speeds Big Reclamation Job

Colorado-Big Thompson Project Makes Progress As Contractors Build Earth-and-Concrete Dam

By RAYMOND P. DAY,
Western Editor

(*Photo on page 1*)

✦ UNDER a $1,375,000 contract with the U. S. Bureau of Reclamation, the contracting firm of Gordon-Bressi & Bevanda of Denver is hurrying to finish Olympus Dam before the winter freeze-up of 1948. The new 2,000-foot earth-and-concrete barrier is one of the remaining unfinished key links in the daring Colorado-Big Thompson reclamation project, which, when finished, will irrigate lands east of the Continental Divide with water from the Colorado River on the western side of the Rockies.

While Olympus Dam is rather a routine job compared to the construction of the 13-mile Alva B. Adams tunnel under the Continental Divide, it nevertheless has posed its own construction problems. Not the least of these was the congestion of men and equipment in small work areas.

The dam is set against a sheer rock abutment on the right bank of the Big Thompson River, about 2 miles east of the town of Estes Park, Colo. It will dam the stream but will not affect its normal flow. Only 550 cfs of water, the same amount taken through the Adams tunnel, will be drawn off and sent to the irrigation works below the dam.

Design of Olympus Dam

The dam is composed of a four-zone earth-embankment section 1,700 feet long, with a 300-foot concrete gravity-type spillway capable of passing 22,500 cfs. The actual spillway is only 120 feet wide, and is centered in the concrete portion of the dam.

Five radial gates 20 x 17 will help to regulate the reservoir height. A reinforced-concrete siphon 10 feet 9 inches inside diameter x 1,000 feet long, being built under this contract, will carry the 550 cfs of irrigation water towards the future distribution works farther down.

The earth and concrete portions of the dam are set on granite bedrock, grouted to a depth of 100 feet below the dam foundation. When the big structure is finished, the river flow will pass over the spillway section.

The Colorado-Big Thompson Project, of which the dam is a vital link, is one of the most spectacular pieces of engineering ever attempted in western reclamation work. Water from the Colorado River will first be stored at Granby Dam on the western slope of the Rockies. The Granby pump station will then pick up 550 cfs and force it through the Granby pipe line into Grand Lake, behind Shadow Mountain Dam.

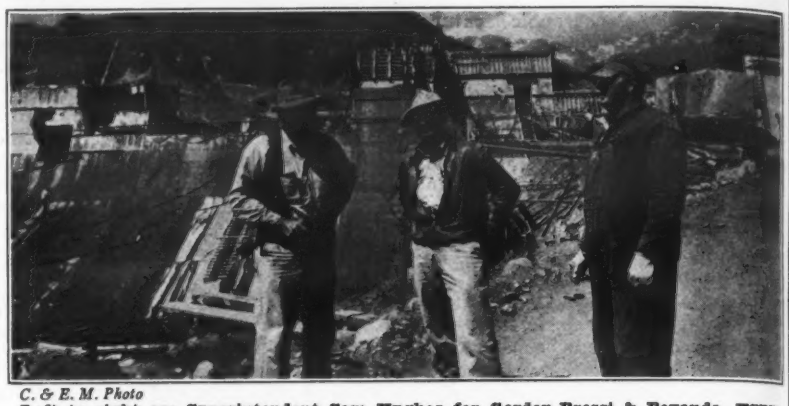
The water will then flow by gravity through the 13-mile-long Adams tunnel under the Continental Divide; it will pass through Aspen Creek Siphon and Rams Horn Tunnel to the penstocks of Mary's Lake Powerhouse, which will run continuously, its tailrace discharging into Mary's Lake.

Mary's Lake will be a fluctuating pool, and water will be stored there for peak-period operation. During these peak periods, when power is vitally needed on the USBR distribution system, about 2,000 cfs will be taken through Prospect Mountain Tunnel and conduits through a 480-foot power drop into the Estes Park Powerhouse. The tailrace from this power plant will pass into the Olympus Dam reservoir.

Diversion of the River

To handle the Big Thompson River during construction work, it was necessary to shift it over the river-valley floor. The first stage of construction involved considerable stripping and the construction of a concrete core wall, keyed well into bedrock.

Most of the dam was built while the river flowed through a channel about 150 feet to the north of the concrete portion of the dam. The concrete portion was brought up almost to final elevation, and about 65 per cent of the earth embankment was also built. When the job was visited, Project Manager Roscoe P. Downs was ready to cut a direct channel towards a gated opening in the spillway section, which would carry the river while the remainder of the embankment section was stripped and completed.



C. & E. M. Photo
Left to right are Superintendent Sam Hughes for Gordon-Bressi & Bevanda, USBR Resident Engineer Ken Dickey, and Steel-Placing Superintendent L. F. Shaw.

One of the unusual things about Olympus Dam is its right abutment. When excavating equipment stripped this section, a vertical plane granite face was exposed where a seismic fault had formed ages ago. The fault was so shaped at the base that a perfect anchor was formed for the concrete part of the dam.

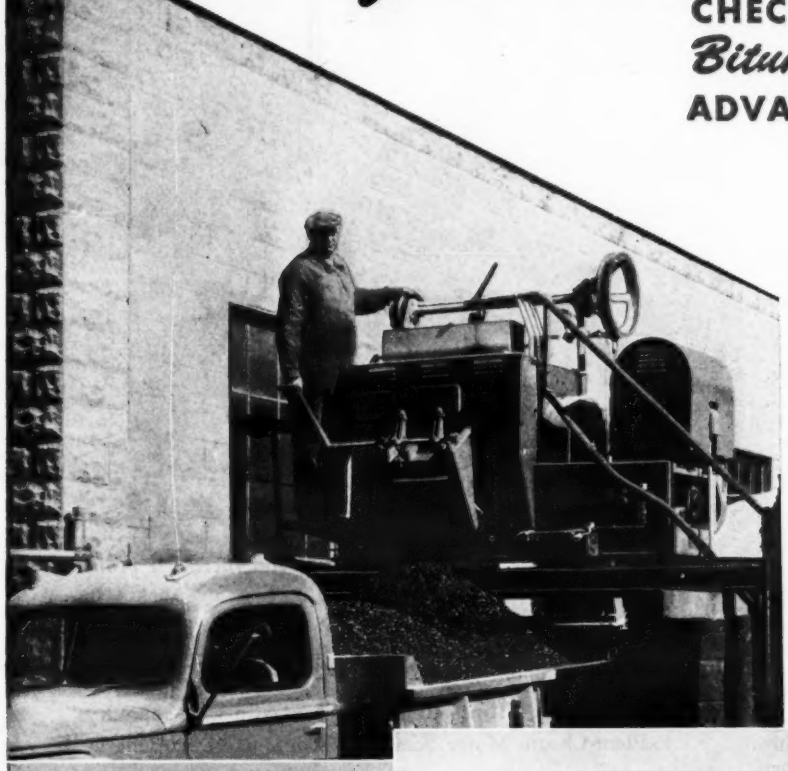
Earthwork Gets Under Way

The Bureau of Reclamation called for about 155,000 cubic yards of impervious

(*Continued on next page*)

MORE BATCHES PER

...even quality mix everba



CHECK THESE KWIK-MIX *Bituminous* MIXER ADVANTAGES:

✓ **EASY TO LOAD** by hand, fro truck or hopper. Smooth, flow-lin skip is power-raised . . . can r on extension track for elevated mi er operation. Skip easily removed charge drum direct from hoppers.

✓ **NON-TILTING DRUM** is a rigi integral part of the frame . . . tilting stresses or strains . . . giv long, trouble-free service.

✓ **FAST, THOROUGH MIX** . . . p mill type mixer has blades specia designed for bituminous materials . push and thoroughly work aggrega and oil from end to center . . . co pletely coat each particle.

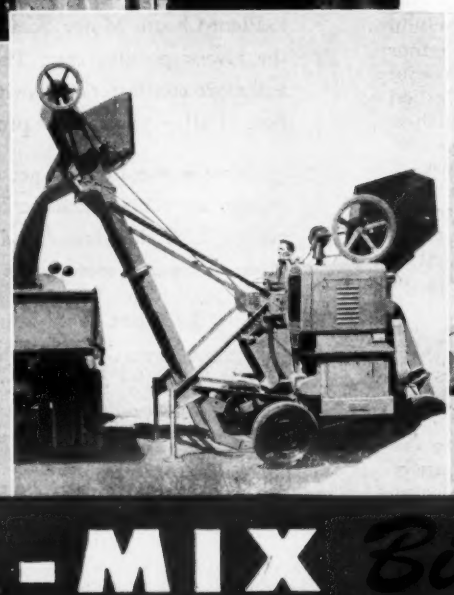
✓ **ACCURATE MIXING CONTRO** . . . 1½" asphalt pump maint continuous oil circulation to and fr

▲ STATIONARY PLANT . . .

Kwik-Mix bituminous mixers are easily adapted to stationary overhead operation. Above is the 10 cu. ft. model, mounted on skids. One man handles the complete operation . . . controls mixed batch discharge directly into truck.

. . . SETS UP ANYWHERE ▶

For discharging above ground level, special tower attachment is available. Skip is power-operated . . . discharge at top is completely automatic. Collapse tower for road clearance.



KOEHRING PRODUCT

KWIK-MIX *Bituminous*

KWIK-MIX COMPANY . . . Port Washington, Wisconsin

earth in the center zone of the embankment section, about 72,500 cubic yards of semi-pervious material in two zones adjacent to the impervious core, and 40,000 cubic yards of rock and cobbles. The latter material was also placed in two zones. A rock blanket forms the upstream zone of the dam, and cobbles form the downstream zone.

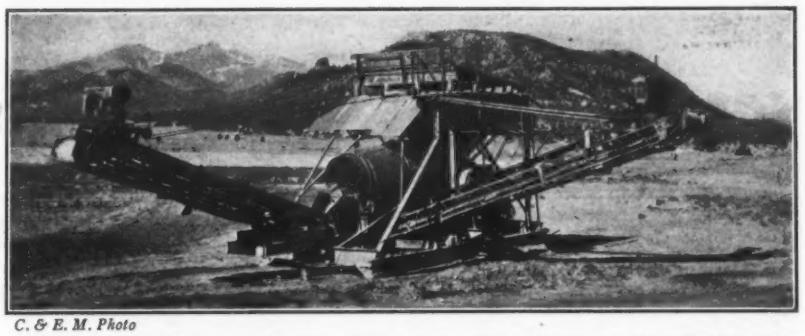
To move this material, a Northwest 80-D shovel was brought in with six end-dump Euclids. Seven Caterpillar D8's and Carryalls were also brought in for the short-haul and stripping work. Processing equipment included two 2,200-gallon water-tank wagons and two McCoy sheepsfoot rollers. Four rented Super C Tournapulls were also used.

Impervious material consisted of a heavy clay-silt soil, quite plastic and workable, located across U. S. 34 from the job. It was loaded by the shovel and trucked in, with assistance by the Tournapulls. Much of the time the impervious material contained about 12 per cent moisture and could be processed without too much watering. During the hot summer weather, though, it was necessary to add water as the earth went in.

The impervious material was laid down in lifts from 4 to 6 inches thick, bladed, watered if necessary, and rolled. Bureau specifications required 95 per cent density, under the modified method, and this was successfully obtained in about eight passes of the big McCoy rollers.

The borrow area from which material for the semi-impervious zones was to be excavated also contained a sizable per cent of large boulders, up to 14 inches in diameter, well suited for the downstream-zone cobble material. A shop-assembled "Gismo" was rigged up to separate the cobbles from the 3-inch-minus material in the semi-pervious zones, after the use of a rock rake had been considered and rejected.

The special rig consisted of a 10-yard hopper covered with grizzly rails 12 inches apart; a 10-foot x 48-inch-diameter revolving trommel with 3-inch openings, driven by a Case engine, to separate plus and minus-3-inch material; a 24-inch x 25-foot conveyor driven by an Allis-Chalmers engine to carry plus-3-inch material; and another similar conveyor driven by an International engine to carry away the smaller-sized material. The entire rig was mounted on 15-inch steel I-beam skids for easy towing by a tractor.



C. & E. M. Photo

This shop-made rig separated cobbles from 3-inch-minus material for the semi-pervious zones of Olympus Dam. It is mounted on I-beam skids for easy towing.

Fed by a shovel or dragline, this rig moved along through the borrow area and performed so well that at times it handled all the material a Northwest 80-D could load. Sometimes the material was hauled directly to the dam by the Euclids, but the machine also worked a great deal in inclement fill weather, stockpiling the cobbles and fines for later use. At one time the rig had stockpiled about 40,000 cubic yards of cobbles.

Most of this material was taken out of the reservoir area ahead of the dam, involving short hauls of less than 1,000 feet one way. The semi-pervious zones were watered and rolled the same way the impervious core had been.

Grouting

Sealing off the bedrock cracks underneath the dam called for considerable three-stage grouting, to depths of 100 feet below the excavated surface. While some routine three-stage work was done, the most successful and efficient work consisted of packer grouting with a Gardner-Denver machine.

For the latter method, holes were drilled the full distance and a grout pipe fitted with three sets of seal leathers was lowered 60 feet in the drilled grout hole. A 5:1 grout mix then started, at a pressure of 125 pounds. When the hole would no longer take grout, the pressure was removed and the pipe was raised to 35 feet; then the process was repeated. A surface operation finished the holes.

Concrete Work

The 18,000 cubic yards of concrete work in the gravity section of the dam was confined in a space little more than 300 feet long x 100 feet wide. For this reason, it was necessary to plan the concrete work around a tight pouring schedule which reached a peak of 7,000 cubic yards per month in July.

For some time the contractors had wanted a good portable, semi-automatic batch plant. Unable to get delivery on a new plant, they planned a custom-built job, and farmed its manufacture out to the McCoy Co. of Denver and the Hardy Scales Co. in Los Angeles.

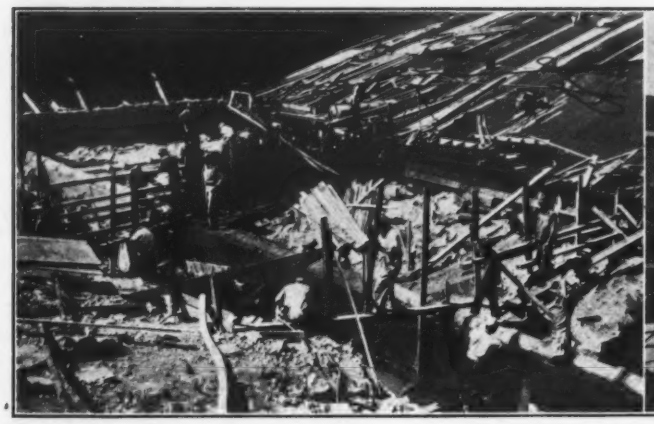
The plant handled four sizes of aggregate, bulk cement, Vinsol resin air-entraining agent, and water. Gates under the bins were opened and closed by hydraulic rams. The plant had a Brown automatic batch recorder and the batch bin discharged to a 2-yard Koehring tilting mixer where the concrete was mixed.

Aggregates and sand for the concrete had been produced previously by other USBR contractors. The material was hauled to the batch plant and stocked in the bins with the help of a feeder hopper and a conveyor line. Bulk cement came to the job by truck and was stored in the batch-plant silo.

The plant proved to be remarkably free of "bugs" when it was first put into operation. There was some minor difficulty in getting the scales and the recorder adjusted, but the arrival of technicians from the manufacturers solved that difficulty. Also, there was an annoying problem of cement flying back up through the batch-bin spout when the mixer was charged. Two small

(*Continued on next page*)

EHOUR
rbatch
-MIX
pply tank . . . generating-type
rners provide close temperature
ntrol of mixing drum . . . non-
lash measuring tank assures uni-
rm oil distribution for even-texture
every batch.
6-SECOND DISCHARGE . . .
de discharge door and sweeping
ade action discharge complete
tch in about 2 revolutions of pad-
e shaft . . . step up batches per
ur . . . boost daily production.
FREE-FLOWING POWER . . .
ti-friction bearings, continuous lu-
ication of reduction gears in oil-
ht casings, provide free flow of
wer with minimum friction loss . . .
you operate skip, oil pump and
charge all at same time.
2 HEAVY-DUTY SIZES . . . 14
ft., and 10 cu. ft. . . . stationary
portable models available . . .
all your requirements for paving,
intenance or patch work.
PORTABLE . . .
unted on pneumatic tires, Kwik-Mix
minous mixers are easily moved.
ick end discharge for direct pour-
saves time on patch work. Stub
les allow more space for dumping
wheelbarrows. (10 cu. ft. model
strated in photograph.)
BITUMINOUS MIXER
CATALOG AVAILABLE . . .
te for new, fully illustrated cat-
on the versatile No. 14 and No.
bituminous mixer . . . or ask your
ik-Mix distributor to show you what
e mixers can do on your jobs.
MIXERS
Koehring Subsidiary
ROADBUILDERS' batchers handle 2 or 3 materials
Johnson Roadbuilders' Batchers are completely portable . . . adaptable to fit any bin . . . provide accurate control. Single-material batcher (foreground) can be arranged for gang operation, to batch 2 materials in practically same time as 1. Multiple-aggregate batcher (background) handles 2 or 3 materials. Other Johnson sizes, types to fit production problems of any plant.
C. S. JOHNSON COMPANY
Champaign, Ill.
310 TRENCHLINER* digs 15' deep, up to 54" wide
For your heaviest sewer, gas and water-main excavation, check this heavy-duty Parsons 310 Trenchliner. Digs to 15' deep . . . 54" wide . . . has 45 digging speeds from 8" to 186" per minute. Boom is telescopic, easily adjusted for digging depths . . . shifts to cut within 16" of either side of machine. Power shifts the arc-type spoil conveyor. 3 smaller Trenchliners also available.
*Trademark Reg. U.S. Pat. Off.
PARSONS COMPANY
Newton, Iowa
MUD-JACK* cuts sub-grade stabilization costs
Where pavements, foundations, sidewalks, curbs or gutters are beginning to settle, Koehring Mud-Jack is a low-cost, easy answer to your problems. Pumps inexpensive soil-cement slurry beneath slab . . . raises structures to original level . . . leaves firm, lasting support. Model 10 illustrated. Ask too, about big Model 50 Mud-Jack for extensive highway use.
*Trademark Reg. U.S. Pat. Off.
KOEHRING COMPANY
Milwaukee 16, Wis.



C. & E. M. Photos

Concrete crews get a base pour ready below the spillway ogee on Olympus Dam (left). Breeze Huddleston (center photo), Carpenter Superintendent, inspects the Tyscru arrangement in a form ready for pouring. At right, workmen set up a form panel as a crane hoists it into position. The steel angle-iron support at the top makes it easy to lift.

Olympus Dam Speeds Big Reclamation Job

(*Continued from preceding page*)

metal air vents were welded at the bottom flange of the bin spout, just above the point where it makes its connection with the mixer. This permitted air to leave the mixer properly, and solved that problem.

The mixed concrete was designed to have 3 per cent of air voids, in place. The usual process, then, was to batch the fresh concrete out with a somewhat greater air content to compensate for the loss in vibration. The amount of Vinsol resin varied from 330 to 380 cubic centimeters per batch, depending on the mix used.

On the massive pours near the base of the gravity section, Gordon-Bressi & Bevanda used some 3-inch and 6-inch aggregate mixes, to finish up a balance of this coarse material left in the USBR stockpile. For thin walls and columns, and to top the dam structure out, a 1¼-inch maximum mix was used.

Scale weights for the various mixes, compensated for moisture, were as follows:

	Maximum 6-Inch	Maximum 3-Inch	Maximum 1¼-Inch
Cement	752 lbs.	838 lbs.	1,100 lbs.
Sand	1,524	1,708	2,213
¾-inch rock	1,351	1,692	1,727
1¼-inch rock	919	1,178	2,384
3-inch rock	1,513	2,255	....
6-inch rock	1,621	....	....
Water	436	436	436
Vinsol resin	380 c.c.	355 c.c.	330 c.c.

Mixed concrete was dumped from the Koehring mixer to several Gar-Bro 2-yard concrete buckets, trucked out to the dam about 400 feet away, and hoisted to the pour by a Northwest 80-D crane. The crane was able to reach all parts of the work with its 80-foot boom.

Concrete Forms

The Olympus Dam job was not large enough to justify an order of steel cantilever forms, so a system of wood forms in 5-foot lifts was designed and used successfully. When the first carload of plywood facing arrived, the carpenter boss and everybody else protested because of the knotty low-grade material, but the supplier said, "If you don't want it, send it back. We don't know when we can promise any more."

The plywood was treated with two coats of Plastiglaze, however, and this resin product sealed the pores so well that one of the forms was used eight times and was still in excellent shape.

Wood form panels were faced throughout with this plywood, and the lowest grade of plywood was used where it would not show. All exposed surfaces were formed with the best of the plywood, which was carefully culled from the carload.

Studs were usually 2 x 6's, spaced on 12-inch centers. Across the top of each

(*Concluded on next page*)

Dual Impact Action Facts

. . . Proved by the Actual Experience of New Holland Breaker Operators

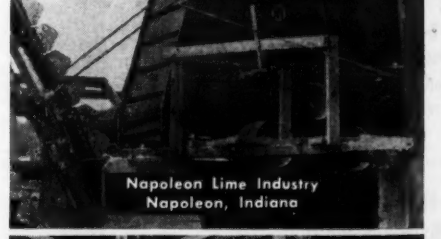
SUPERIOR PRODUCT "Engineers have awarded us contracts on the basis of the superior stone that Dual Impact Action produces."

LOW MATERIAL HANDLING COST ". . . crushes run of the quarry minus 30" to 50% ¾" down stone and 50% lime dust *in one operation.*"

LOW UPKEEP "The breaker itself, after crushing more than 110,000 tons shows no signs of wear."

GREAT CAPACITY "With the same crew, trucks and shovel and only one-third the horsepower we are producing fifty percent more tons with the one new breaker."

LOW POWER COST "In the first year power savings paid all maintenance and over $2000.00 beside."



Ask your New Holland dealer to show you "The New Stone Age"—a color movie of the Double Impeller Breaker in action. See for yourself how less waste fines . . . reduced power requirements . . . add up to more profits for your pockets.

Available in 4 sizes; 1520, 2020, 3030, 5050

NEW HOLLAND MANUFACTURING COMPANY
Division of New Holland Machine Co.
Mountville, Pa., U.S.A.

GRIFFIN
WELLPOINT SYSTEMS
JETTING PUMPS

GRIFFIN WELLPOINT CORP.
881 E. 141st ST., NEW YORK 54, N.Y.
TEL. ME. 5-7704

panel was a piece of 4 x 6-inch steel angle, securely bolted. This piece of angle iron stiffened the top of each form panel and made the sections easy to lift without damage by a crane. The bottom of each panel was tied to previously poured concrete by means of dummy Richmond Tyscrus embedded in the top 6 inches of each pour. The tops of the form panels were lashed in place by Richmond Tyscrus and steel hairpins in the previously poured concrete. The tie rods went in on 5-foot centers, or closer when needed.

On one section of the dam, where a slab protruded back of the spillway ogee, special tie bars were put in place to lend a factor of safety to the pour when supports were stripped.

The dam had all of the intricate form work which had ever been designed on much larger projects, according to most of the carpenters. Both Roscoe Downs and his assistant, Sam Hughes, however, are veteran dam builders, and the layouts were made quite easily on a 30 x 35-foot slab of steel-troweled concrete near the carpenter shop, made especially for that purpose.

All forms were built in this central carpenter yard below the dam, where power saws and tools were available, and the finished forms were hauled to the dam. Only minor fitting was necessary on the job.

The steel forms for the old Tucumcari Project tunnels were cut down to build the 1,000-foot siphon on this contract. Rock excavation for the siphon barrel had been finished by a Northwest dragline, and the steel forms were arriving when the job was visited. Construction work was one year old on July 7, and was expected to be well finished except for minor clean-up details by late November.

Situated as it is in the heart of Colorado's vacationland and mountain country, the job also had plenty of color. Roscoe Downs tells about the day last winter when the electrician called up the field office and said, "Say, fellows, if you need me just blow the whistle and I'll hear it. I'm up here on the ridge behind the dam dressing out an elk!"

Personnel

Gordon-Bressi & Bevanda was represented on the job by a group of key dam-building experts including Roscoe P. Downs, Project Manager; Sam Hughes, Superintendent; Breeze Huddleston, Carpenter Superintendent; Walter Hurst, Excavation and Earth Superintendent; Ed Swanson, Concrete-Placing Superintendent; and L. F. Shaw, Steel-Placing Superintendent.

The job was designed and administered under the general supervision of Walker R. Young, Chief Engineer of the USBR, with Avery Batson as Regional Director, Frank Matejka as Construction Engineer, and Ken Dickey as Resident Engineer.

Several-Size Rims Mounted on One Hub

A sheave which enables rims of various diameters to be mounted on the same hub is announced by the Transmission Machinery Corp., P. O. Box 7823, Dallas, Texas. It will also permit hubs of different bore to be mounted on the same size of rim.

The hub and rim are held together by heat-treated socket-head screws which pass through specially drilled holes in the rim web. For the smaller-diameter sheaves, fillister-head screws are used. In both cases, lock washers are used to assure a tight fit. The hubs are bored to shaft size and key-seated. Concentricity of bore with the rim diameter is assured by machining the shoulders of the hub and the web face.

The Transco Model LD interchangeable-hub sheave is available for drives attached to power units in the ½ to 10-hp range. It may be obtained in 1, 2, or 3-groove models for A-section belts; or in combination grooves for A or B-section belts in sizes from 2.2-inch to 18.4-inch pitch diameter.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 85.

Military Oil Filter

A replacement oil-clarifier unit for military vehicles is produced by W. G. B. Oil Clarifier, Inc., of Kingston, N. Y. The Model TRU-7, as it is designated, is for installation on the standard military oil-filter base, and is designed for use by fleet operators who have acquired military vehicles. It uses the regular T-108 W. G. B. replaceable filter cartridge, which can be changed without tools, the manufacturer points out, and which can be used on all types of engines with all kinds of oil; it is made from a specially processed cotton.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 46.

Caterpillar Staff Changes

Gerald W. Wilson and William F. Jordan are new District Representatives in the Eastern Sales Division of the Caterpillar Tractor Co. Wilson will represent the company in contacts with distributors in northern Georgia, South Carolina, and eastern Tennessee, while Jordon will contact dealers in northern Ohio, Michigan, and West Virginia. Wilson succeeds F. S. Foster, who was recently named Assistant Eastern Sales Manager; and Jordan succeeds R. E. Jeffries, who recently joined the Missouri Valley Machinery Co.

CHOOSE THE RUGGED

MILLER *Tilt Top* FOR ALL HEAVY DUTY HAULING

Shown is our heavy duty MODEL B 10 ton.

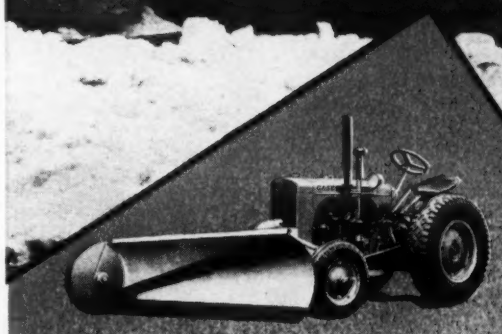
- HYDRAULIC TILT CONTROL
- TWO SPEED WINCH
- ELECTRIC BRAKES

Miller trailers fit all your hauling requirements featuring 3 to 10 ton models. Model B has electric brakes, hydraulic tilt control, 16" deep axle with Budd hubs and wheels, plus many other features making it the safest and most dependable trailer on the road.

IMMEDIATE DELIVERY
Prices $450 to $895

RAY MILLER RESEARCH ENGINEERS
MILWAUKEE 8, WISCONSIN

MAN SAVERS in Snow



● With a Case-powered loader you have more than a fast, tireless worker to hustle big bulk of snow on its way. Compact construction and nimble-footed mobility of Case industrial tractors make it easy and economic to clean up the corners.

The same capacity to "go places" helps do a clean, complete job in plowing snow, whether on sidewalks, streets, roads, airports, or plant premises. You save precious manpower from wasteful work with hand shovels. And in summer the same thrifty Case tractors load earth and other materials, pull scrapers, graders, mixers, etc.

Extra strength and stability of Case tractors make them ideal power plants for mounted equipment. Their cooling and lubricating systems are engineered for wide extremes of heat and cold. They have ENDURANCE for continuous operation with minimum maintenance. Ask your Case industrial dealer for full information on any or all of the four sizes, and on snow-handling equipment for them.

COMPLETE, COMPETENT SERVICE

Your Case industrial dealer is strategically located to serve you conveniently, staffed and equipped to serve you well. Besides Case tractors and engine units he offers a well chosen line of related equipment such as tractor-mounted loaders, mowers, snow-plows, sweepers, bulldozers and scrapers. Specializing in the power and equipment problems that prevail in your area, he has broad experience that can be helpful to you in the choice, use and care of equipment. J. I. Case Co., Racine, Wis.

CASE

The Pac-Air is a recent addition to Ingersoll-Rand's line of portable compressors. It is designed for light-duty use, for utility use on large projects, and for use in combination with the J-10 Jackhamer.

Utility Compressor

A new gasoline-engine-driven portable compressor is announced by the Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y. The Pac-Air is for light-duty use or for use as a utility compressor on large-scale projects. And in combination with the J-10 utility Jackhamer, it can be used for drilling rock, masonry, or concrete.

The Pac-Air is described as a 2-cylinder single-stage compressor with a piston displacement of 37.5 cfm at 80-psi pressure. It has an automatic unloader which allows it to be run at a constant speed but to compress air only when needed. The compressor and gasoline engine are mounted on an air receiver which forms an integral part of the running gear. The 6.00 x 16 pneumatic tires, and a ball-and-socket type of trailer hitch which can be quickly detached, are designed to make the Pac-Air easy to tow behind a truck or passenger vehicle.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 68.

Reproducing Machine

A reproducing machine which features continuous operation is manufactured by the Ozalid Division of the General Aniline & Film Corp., Johnson City, N. Y. Exposure and dry development are combined in one automatic operation in the Super-B. The unit will reproduce anything drawn, typed, printed, or photographed on a translucent material, the manufacturer points out.

The Ozalid Super-B will accommodate materials up to 42 inches in width. It prints and develops at speeds of up to 25 fpm. It can be wired for 200/235-volt ac 50 or 60- cycle single-phase circuits. Controls are grouped so that the operator can work from a standing or sitting position. Prints can be delivered to the front or rear of the machine. A special inside receiving tray is designed for use when Ozaprints are large or of varying sizes.

Among the features listed for the dry-developing system used in the Super-B are these: it requires no ammonia handling, there is thermostatic heat control of super-heaters in the tanks, and there is a humidity control. The unit uses a high-pressure mercury vapor lamp as an exposing medium. Net weight of the Super-B is 1,625 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 108.

Sales Heads for Eutectic

New members have been appointed to the Board of Regional Sales Supervisors of Eutectic Welding Alloys Corp., New York City. Wm. R. Bajari has been assigned the Western area; Robert H. Groman, the West Central area; L. D. Richardson, the South Central area; G. Luke Mizell has the Middle and South Atlantic area; John H. Poulson, the Eastern United States and Canada area; Paul E. Miller, Mid-East area; Jack R. Koske, the East-Central section.

Heavy-Duty Transmissions

A complete line of heavy-duty transmissions is described and illustrated in a 12-page catalog issued by the Fuller Mfg. Co., Transmission Division, Kalamazoo 13F, Mich. Among the items listed are the unit-mounted, auxiliary, and amidships-mounted transmissions which comprise the Fuller line.

The data presented cover gear ratios, weights, dimensions, installation details, and so forth. The information is intended as an aid to those who are making a preliminary selection of transmissions from the catalog. Moreover, a specification sheet in the catalog can be filled out to provide Fuller engineers with enough information so that they can recommend a specific transmission for any desired application.

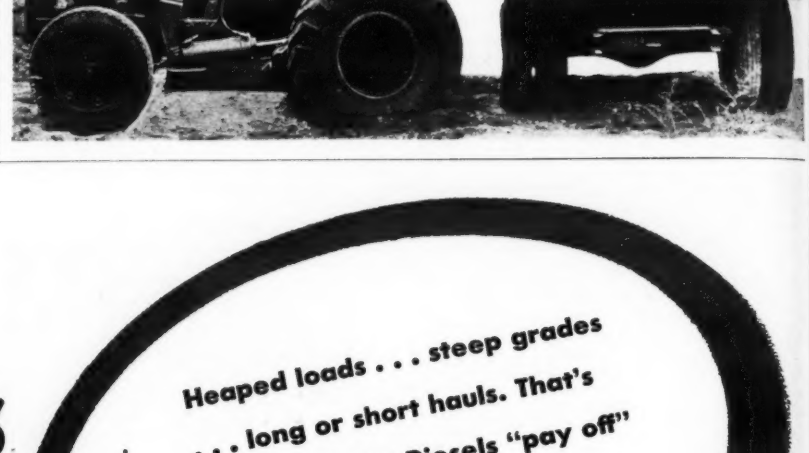
Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 100.

MARMACH LOADER *Now Available for International Wheel Tractors*

The fast, efficient MARMACH LOADER is designed for International wheel tractors. Built for durable, heavy-duty service, it is the economical answer to many tough digging and loading problems.

See your local International Industrial Dealer or write for detailed information on how the MARMACH LOADER can save you time and money.

Marion Machine Company
Marion, North Carolina



What makes a job Tough

Heaped loads . . . steep grades . . . long or short hauls. That's when Cummins Diesels "pay off" . . . hauling more material at low cost.

CUMMINS DIESEL
SINCE 1919 PIONEER OF PROFITABLE POWER THROUGH HIGH SPEED DIESELS

Your Cummins Dealer will show you other examples of the performance of Cummins Diesels in the current issue of *The Dependable Diesel.*

Colonial Sand and Stone Company, Inc., New York City, finds Cummins Diesels better for its job. One of the first contractors to find Cummins Power profitable for short hauls, Colonial now operates a total of 197 Cummins Diesels. Colonial's Cummins-powered fleet includes 10 new Model D 664-MA Federal ready-mix trucks and two FK Macks recently repowered with Model NHB-600 Cummins Diesels, powered with Model NHB-600 Engines. Used to haul heavy slag and sand in New York's hilly Eastchester area, the repowered FK Macks cut delivery time 50 per cent and fuel costs 25 per cent.

CUMMINS ENGINE COMPANY, INC. • COLUMBUS, INDIANA

Avoid Legal Pitfalls

Edited by A. L. H. STREET, Attorney-at-Law

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Decision by Contracting Officer Appealed Too Late

THE PROBLEM: *A naval-yard construction contractor sought to enforce a claim against the United States for remission of liquidated damages awarded against him by the Government's contracting officer, and to recover additional costs on account of changed construction. Did he lose the right to do so through failing to seek revision of reversal of the decision within 30 days after the officer's decision? What effect, if any, did the First War Powers Act of 1941 have on the case?*

THE ANSWERS: The United States Court of Claims decided that the contractor's delay was fatal. The First War Powers Act did not permit modification of a contract that had been fully performed before the Act was adopted. (Centaur Construction Co. v. United States, 69 Fed. Supp. 217.)

The contractor did not seek to secure revision of the contracting officer's decision until 16 months after issuance of the final voucher, although the contract required any appeal to be taken within 30 days. The contracting officer then so revised his ruling as to remit the liquidated damage award and allow additional costs. The Comptroller General refused to recognize the settlement, and the contractor unsuccessfully sued in the Court of Claims.

The Court of Claims said that it was unnecessary to determine whether or not the contracting officer might have reconsidered the matter within a "reasonable time" after expiration of the 30-day limit; the claims could not remain open indefinitely without effort to dispose of them.

As to the effect of the First War Powers Act of 1941, the Court of Claims decided that it was intended to facilitate performance of pending and future projects, but not to empower a Governmental agency like the Navy Department to modify a contract that was "out of its hands," through performance and final payment, when the Act was passed.

Job Acceptance Delayed; Cost of Upkeep Recovered

THE PROBLEM: *Was a landscaping contractor on a housing project entitled to reimbursement for maintenance cost, pending arbitrary and unreasonable delay of the Government's representative in making final inspection?*

THE ANSWER: Yes, decided the United States Court of Claims. (Stafford v. United States, 74 Fed. Supp. 155.)

The court found from the evidence that the work had been completed and that there was "evidence of an obvious reluctance on the part of the defendant to take over the burden of maintenance of the landscape work during the hot, dry months of the year, coupled with an inclination to leave with the plaintiff as long as possible not only this burden but the responsibility for providing protection against acts of vandalism on the part of the tenants of the project as well."

The court added that to approve the Government's delay in making final inspection "would have the effect of requiring plaintiff to spend the summer with a hose in his hand waiting for Government red tape to . . . unwind, or for the contracting officer to have a change of heart and decide plaintiff had been punished enough. If we accepted defendant's construction" of the agreement "the contracting officer by standing pat could have required plaintiff to water and re-seed the lawn indefinitely."

Extra Pay for Ditching Not Indicated on Plans

THE PROBLEM: *The spex for a highway job defined excavation as including excavating, sloping, and construction of ditches "all to the required alignment, grade, and cross section shown on the plans". Was the contractor entitled to extra pay, in excess of unit prices, for constructing ditches not shown on the plans and not listed as a separate item of work in the bidding?*

THE ANSWER: Yes, decided the United States Court of Claims. (First-Citizens Bank & Trust Co. v. United States, 76 Fed. Supp. 250.)

The Government contended that an ambiguous inscription on a diagram appearing on the plans, "Ditch where designated", meant that the contractor could be required to excavate ditches designated by the engineers although not shown on the cross-section drawings.

Disposing of this argument, the Court of Claims said: "The meaning given by the defendant to the words 'ditch where designated' . . . can be sustained only by resolving all doubts in favor of the Government. This would be contrary to the well established rule that contracts, drawings, and specifications should not, for the purpose of resolving subsequent doubts as to the meaning and applicability of the language and provisions thereof . . . be interpreted . . . in favor of the party who drafted and prepared them, but . . . more favorably to the other party who did not have any part in their preparation."

Contractor's Liability If Sub's Worker Is Hurt

THE PROBLEM: *Pocatello, an Idaho city, let a sewer contract. The contractor sublet the trench excavation. An employee of the subcontractor was killed through neglect of the contractor's employees. Could the parents of the dead worker maintain a damage suit against the contractor, as distinguished from a proceeding under the state Workmen's Compensation Act?*

THE ANSWER: No, decided the Idaho Supreme Court. (Gifford v. Nottingham, 193 Pac. 2d 831.)

The court interpreted the compensation act as making the contractor and the subcontractor liable for the payment of an award on account of the accident, subject to the subcontractor's right to reimbursement by the general contractor.

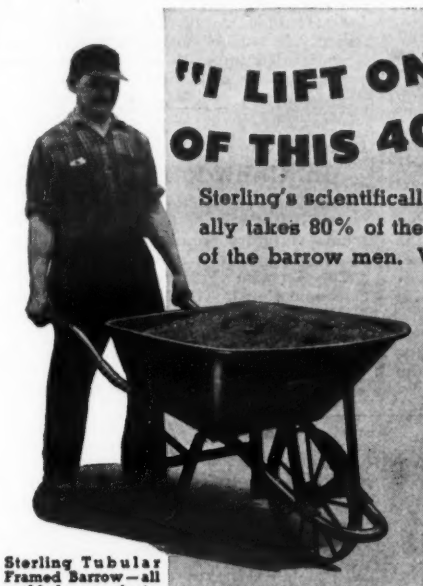
When Uncle Sam's Officers Disagree in Their Rulings

THE PROBLEM: *An airport contractor chose to excavate a ditch before grading. Three successive contracting officers reached different conclusions as to how the contract should be read in measuring the excavation for payment purposes. Was the United States Court of Claims justified in making an independent interpretation, under which payment would be made according to measurement from the invert of the ditch to the intersection of the sides of the surface that existed when the ditch was excavated?*

THE ANSWER: Yes. (John Arborio, Inc., v. United States, 76 Fed. Supp. 113.)

The contractor insisted that the contract interpretation made by the second contracting officer, which was more favorable to him, should be adopted. The Court of Appeals decided: "The decision of the contracting officer is not final. . . . Here we have a

(*Concluded on next page*)



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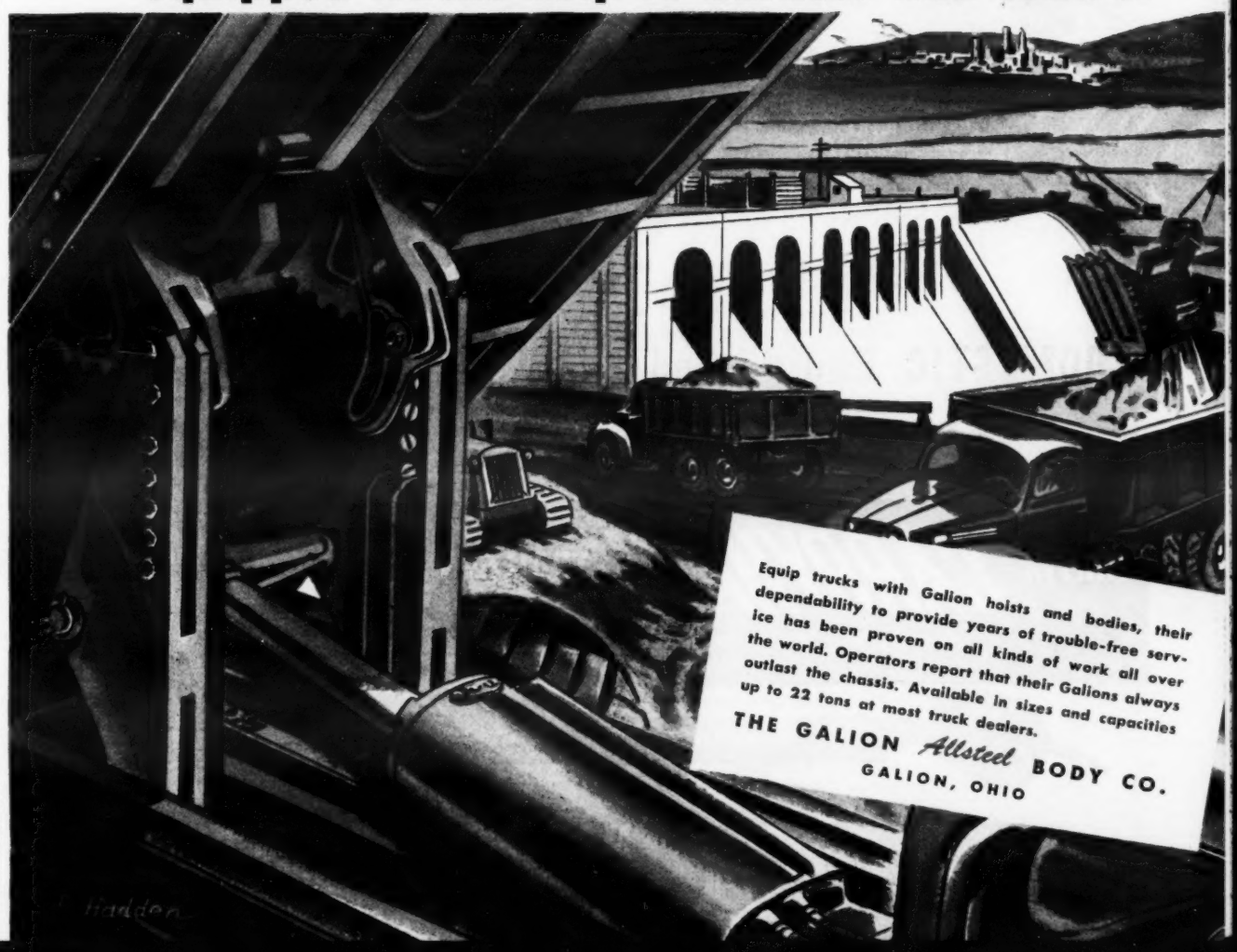

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Avoid Legal Pitfalls

(*Continued from preceding page*)

succession of contracting officers and different interpretations of the contract and specification provisions involved. It therefore devolves upon the Court to decide whether or not the other interpretation is correct, or to decide that neither is correct and adopt an interpretation of its own, entirely different from the other two."

The Court found that its interpretation was in line with that adopted by the first contracting officer and concurred in by the third, "by the Board of Contract Appeals, by the authorized representative of the head of the department, as well as by the Commissioner of this Court. It logically follows that plaintiff's claim for alleged underpayment . . . is without foundation."

One of the three judges of the Court of Claims dissented. His grounds were that the contract provided for determination of the meaning of specifications and drawings by the Contracting Officer, and that where there were successive officers, by the one acting at the "relevant time". Said this judge: "When the contractor confides to the Government's agent the power to arbitrate questions of interpretation, he intends to lodge that power in some person who shall, by Government designation, occupy the position of contracting officer at the relevant time. He does not intend to lodge it in a changing succession of persons whose different minds would, naturally, react differently to a close question, and thus leave it undecided until the contract was finally terminated by settlement and release."

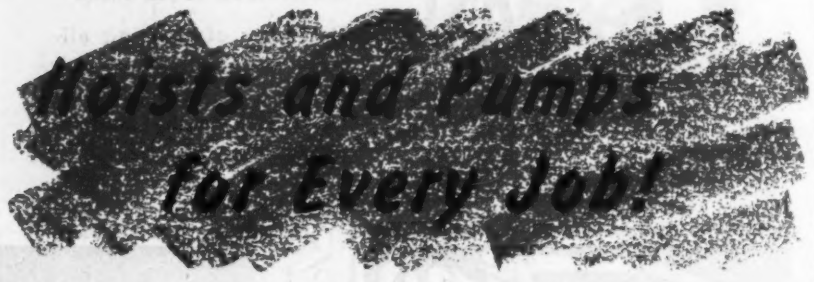
Effect of Irregularity In Contracting With City

THE PROBLEM: *Could contractors force a municipality to pay for resurfacing streets where statutory requirement that such contracts be in writing was not complied with?*

THE ANSWER: Yes, decided the Nebraska Supreme Court. (Gee v. City of Sutton, 31 N. W. 2d 747.) But the contractors could collect only the reasonable value of the work accepted by the city. The gist of the decision is as follows:

Where a municipality receives and retains substantial benefits under a contract which it was authorized to make, but which was unenforceable because irregularly executed, it is liable for the reasonable value of the benefits received. The principle applied is that of reimbursement. The contractor can recover only the actual cost of the services rendered and material furnished, without the allowance of profits, but with interest not exceeding the legal rate. When suit is brought to recover reasonable compensation in such cases, interest runs from the date of the judgement in the contractor's favor, when the amount due is determined.

Where the contractor is a partnership, the value of services rendered by members of the firm may be collected as part of the reasonable value of the work, not as profits.



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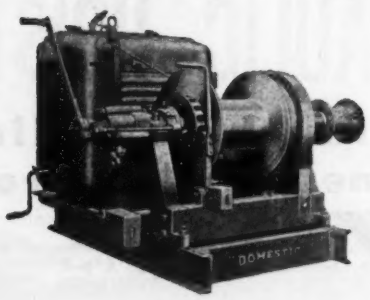

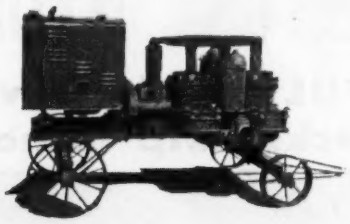

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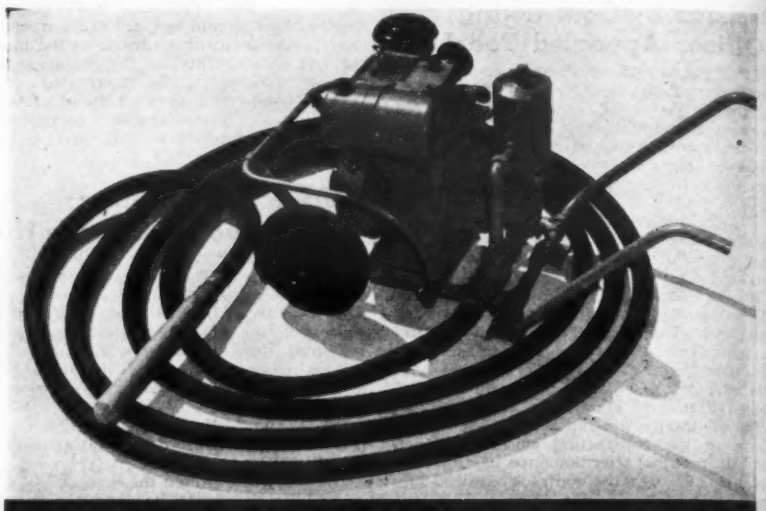

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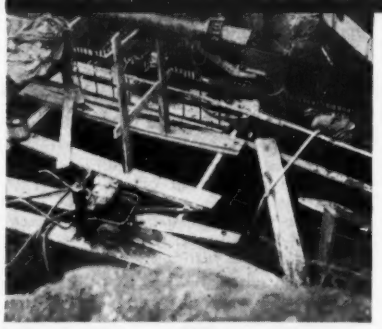

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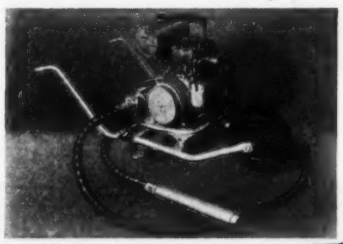

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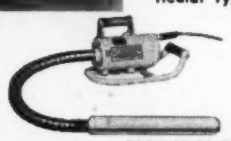

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Winter Snow Fight Keeps Roads Clear

(*Continued from page 1*)

costs are much less, in some cases 80 per cent less.

Controlled planting of roadsides out to the right-of-way limit lines has also been started, with a view towards minimizing the amount of autumn work in preparation for winter snows.

Climatic Conditions

Last winter the area of greatest snowfall was the northeastern section of the state, with relatively light snowfall southwest of the Missouri River. However, this is not always the case. There have been years when heaviest snows fell in unpredictable parts of the state. Because of this condition the snow program is flexible.

November 1 is the time of year when snow usually begins to fall, but it can come earlier, and sometimes does. By March 1 the winter season is usually over, and by April 1 the snow has melted and gone away. December, January, and February are the tough months.

Snowfall last winter ranged from a high of 84.3 inches at Grafton to a low of 19.5 inches at Hettinger, in the extreme southwestern corner of the state. The season's average was 45.8 inches for the state. This is about 25 per cent higher than usual. Accompanied as it was by sub-zero temperatures and stiff wind, last year's snow was one for the books.

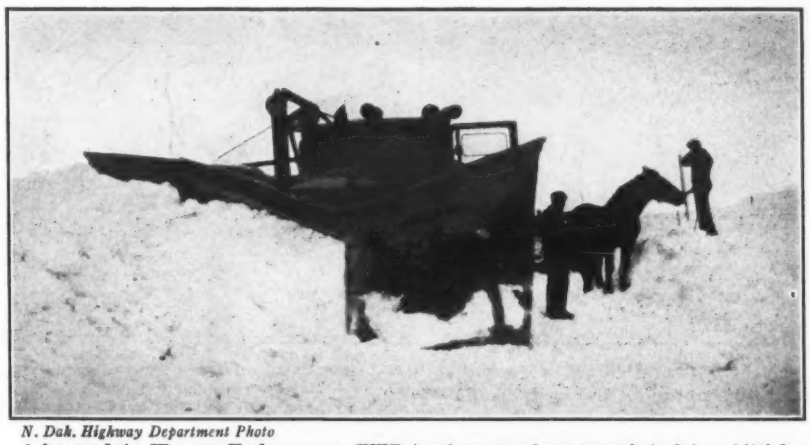
North Dakota has another climatic problem, too. Winter temperatures, often the lowest in the nation, make it impossible to stockpile cinders or sand without adding about 100 pounds of calcium chloride or salt to the cubic yard, and then liberally sprinkling this material over the top of the pile. Unless this is done, the stockpile will freeze solid.

Snow-Fighting Organization

Heading the snow-removal part of the regular highway maintenance organization is Maintenance Engineer Ray Robinson, with headquarters in the state capitol building at Bismarck. He is responsible to Chief Engineer M. P. Wynkoop—and to approximately 145,000 adult male North Dakota citizens in various stages of apoplexy if operations do not click with the precision of a fine watch.

Under Robinson are the division maintenance engineers who work for division engineers at Bismarck, Valley City, Grand Forks, Devils Lake, Minot, Williston, and Dickinson. At the present writing, Williston and Dickinson do not have maintenance engineers owing to a shortage of qualified help, but these positions will be staffed later on. Division engineers and division maintenance engineers report to Robinson on matters regarding snow removal.

Under the divisional set-ups come the snow crews and equipment assigned to the various places. These men and units of equipmnt are, of course, subject to the overall snow picture, statewide in scope, which is governed from Bismarck as it develops. Thus it may easily be that a rotary snow plow is shifted 150 miles to another division by a telephone call, made from Ray Robinson to one of the division engineers.



N. Dak. Highway Department Photo
A heavy-duty Wausau V-plow on an FWD truck pauses long enough to let a skittish horse and a North Dakota farmer go by.

As the organization now stands, equipment operates without the use of two-way radio. While radio communication would be desirable, of course, its cost has so far precluded its use. Later on, if funds permit, the State expects to install such equipment.

Snow-Fighting Machines

A total list of snow-fighting equipment in North Dakota seems impressive, until one considers the magnitude of the job. Carried on the State Highway Department records are 170 pieces of snow-removal equipment, as follows: 14 motor graders, with V-plows and wings; 11 one-way truck-mounted plows; 87 light-duty V-plows, truck-mounted; 48 heavy-duty V-plows, all-wheel-drive, truck-mounted; 9 heavy-duty Snogo rotary plows; one light-duty Snogo rotary plow.

In addition to these there are a few miscellaneous light-duty push plows, and almost all the motor graders of the Highway Department. Motor graders all over the state actively fight snow in winter, some equipped with nothing more than the conventional blade, or at most a wing to sweep shoulders clear.

How the equipment is divided between districts or divisions can best be illustrated by using the Devils Lake Division as a typical example. At Devils Lake are based these units: 2 one-way plows, truck-mounted; 14 V-type light-

(*Continued on next page*)

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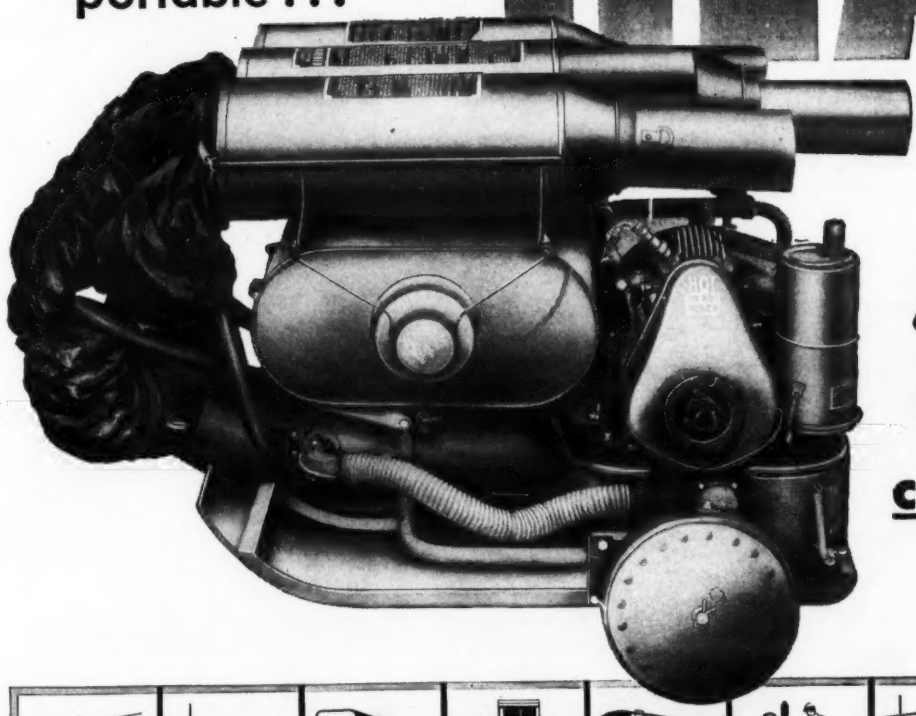

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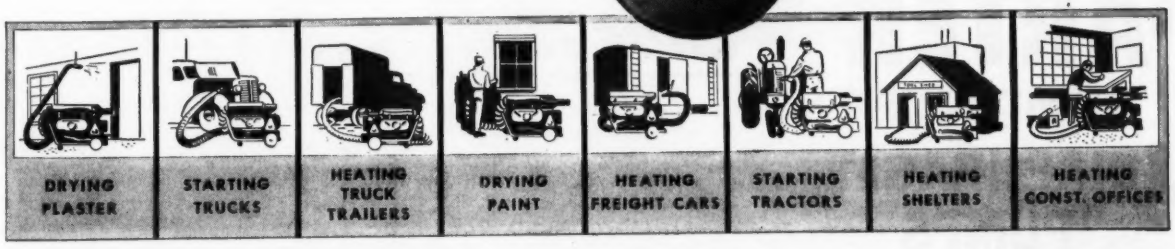

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N. Dak. Highway Department Photos

Traveling at 40 mph, the Ford-mounted V-plow at left clears a North Dakota highway. These V-plows do a good job despite heavy snows (center photo). But when they can't get through, the Department uses rotary Snogos—the light-duty one at the right is eating away at a snowbank along one of the highways near Des Lacs Lake.

Winter Snow Fight Keeps Roads Clear

(Continued from preceding page)

duty plows; 8 heavy-duty V-plows; 1 heavy-duty rotary Snogo; 4 motor graders with wings.

The machines engaged in snow-fighting work are equipped with conventional headlights, and now all the units are also being fitted with 6-inch blue warning lights. The latest type of light is the flasher, though some of the lights are continuous-burning.

Snow-fighting equipment can be serviced in the field if necessary, and repairs usually are made in the division repair shops assigned to that work. A reasonably good supply of vital parts is stocked to insure the efficient operation of the machines when they are most needed.

Snow-Removal Methods

In September and early October, before the snow begins to fall, mowers and blade graders clean the highways thoroughly out to the right-of-way limit lines. This autumn clean-up removes grass, weeds, and brush which might catch snow and hinder the work to be done when the snow begins to fall.

About 500 miles of snow fence is also maintained by the Department to intercept as much of the snow as possible before it hits the highway. These fences are repaired annually and put up in the autumn, in advance of the winter season.

Stockpiles of sand, cinders, and calcium chloride are also prepared in autumn, and located in strategic spots where curves and hills can be sanded easily if glaze or sheet ice develops.

When the first light snows appear, men and equipment are ready. At first the light push plows go to work. They sweep the feather-light snow away and clean the shoulders. Constant maintenance is necessary even so, for often high winds come up after a storm has subsided to drift the snow back over the road.

As the snow gets heavier, heavier plows move in. By and by a big ridge of snow begins to develop along the edge of the shoulder. The rotary Snogo plows then move in to throw the material far over to the side. Often motor graders are also used along the roads where fields are level, to throw up a snow dike which intercepts the snow much as a snow fence does and prevents its drifting back over the highway.

During the height of the snow season the job gets tougher and tougher. When highways begin to drift shut in places, because of heavy winds, the State sends out a Snogo accompanied by a heavy-duty V-plow. The big V-plow blasts its way through the snow, ramming holes through the drifts. By and by it comes to a place where it stops, and the wheels spin. The operator backs up

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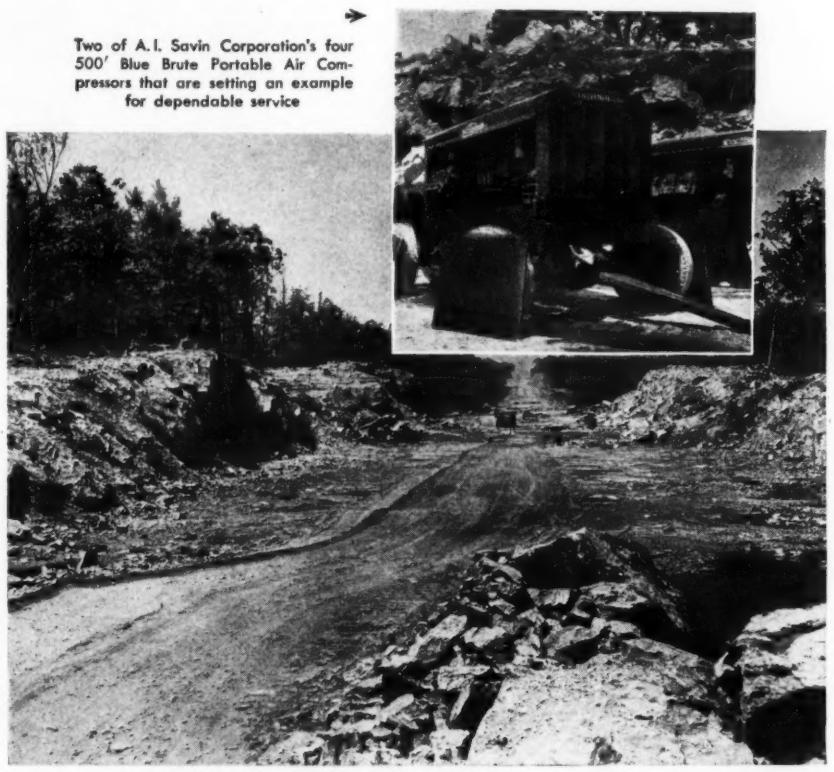

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On jobs like the Boston Post Road relocation project — with rock cuts containing 70,000 yds. in a single pocket — you soon find out what your air equipment can do!

A. I. Savin reports 100% satisfaction from Worthington Blue Brutes. It's easy to see why. Blue Brute 500′ Portable Air Compressors are packed with such advanced features as full force-feed lubrication and easy-breathing Feather* Valves—the most efficient ever made. No wonder these "portable powerhouses" have stood up under long, gruelling service without an extra minute down or an extra cent spent for repairs!

Also, Blue Brute UMW-40 Wagon Drills are the most versatile in the field . . . fast, powerful drilling machines that swing into action at any angle, to make short work of the toughest rock formation!

Adding up, here's a completely dependable air supply and air tools that make the most of it . . . a typical Blue Brute team that is beating schedules the country over. For further details that prove *there's more worth in Worthington*, see your nearby Blue Brute Distributor or write us direct.

*Reg. U. S. Pat. Off.

H8-8

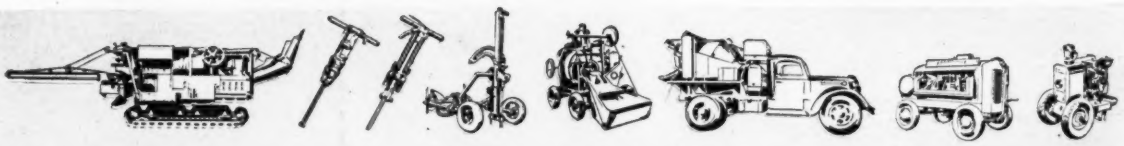
Making fast speed through mixed rock! One of A. I. Savin's UMW-40 Blue Brute Wagon Drills in action

WORTHINGTON

WORTHINGTON PUMP AND MACHINERY CORPORATION

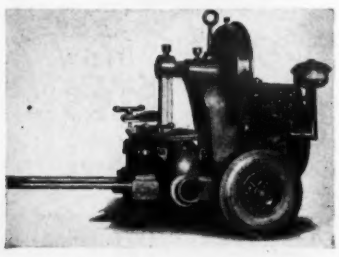
Worthington-Ransome Construction Equipment Division, Holyoke, Mass. Distributors In All Principal Cities

BUY BLUE BRUTES



IF IT'S A CONSTRUCTION JOB, IT'S A BLUE BRUTE JOB

CARTER HUMDINGER DIAPHRAGM PUMPS



Rugged! Yes, it's rugged alright. Countless testimonials make us proud in the knowledge that here is a pump that's tough enough to stand up under the harshest treatment! Designed to be able to "take a beating" CARTER offers for your most exacting demands a complete line of HUMDINGER diaphragm pumps. See for yourself!!

● **Write for Bulletin 4503**

RALPH B. CARTER CO.
HACKENSACK, NEW JERSEY
53 PARK PLACE, NEW YORK 7, N. Y.

about 50 feet, plunges head-on into the snowbank, and can't get through. He then backs up and gives the rotary the signal to go to work.

Making about ½ mile per hour, the rotaries eat their way through the drifts until the V-plows can again take over. Last winter in one particularly tough blizzard, a rotary-plow operator was caught in a slide great enough to prevent his escape. He stayed for 36 hours in the cab of his machine while the blizzard howled across the prairie. By and by the storm stopped, the sun emerged, and the operator dug his way out and resumed work.

Public Relations

Snow fighting poses a little problem in public relations for Maintenance Engineer Robinson. A typical scene involving one of North Dakota's 145,000 adult male citizens is about like this:

North Dakota Farmer (storming angrily into the Highway Department office): "I want my road open."

Robinson: "Isn't it open now, Mr. Olsen?"

Olsen: "No."

Robinson: "If it's not open, how did you get in here?"

Olsen: "My road has not been plowed . . . (spluttering) . . . On the way to town I saw *two* plows, one working behind the other. If you have as many plows as that I demand service!"

Robinson: "Now Mr. Olsen, we don't have too many plows. Working them in tandem—er, one behind the other, that is—is the way to get the most work done. Just as soon as we get through on Number 10 we'll get to you on Number 6. We've got so much more traffic on 10, don't you see?"

N. Dak. Highway Department Photo

A Snogo comes to the rescue of a car trapped in North Dakota snow. Fortunately the two occupants of the car got out before they froze to death.

Olsen (obviously failing to see): "Last year I paid $170 in taxes. I want my road open." (stalks out of office, muttering to himself.)

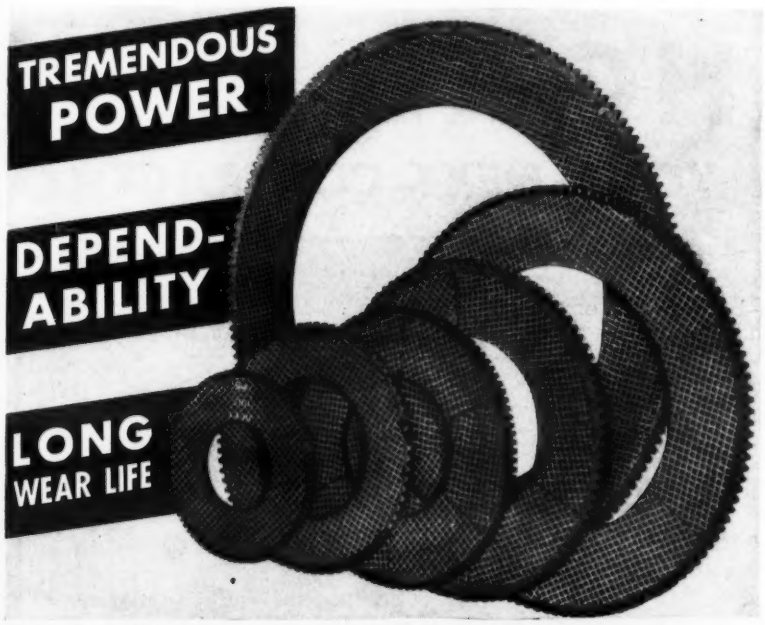
Because of scenes like this, snow-removal methods can't always be just what maintenance men would like them to be: for instance, the plows almost always work singly on the highways. That way the farmers are happy.

"They are not to be criticized", Robinson points out. "The basis of their kicks is the fact that they are thrifty people; they don't like to see waste. There's nothing wrong with that; in fact, it rather reflects our general Highway Department policy."

Changing weather conditions usually play a big part in snow-removal work. It frequently happens that temperatures of 30 below zero give place in a few days to 40 above, and vice versa. During the brief warm spells, snow settles and packs, and is not likely to blow again if cold weather returns. On the other hand, fresh snow in cold weather will blow and drift for weeks if the temperatures stay down.

In any case, snow-removal work is based on the fact that it is easier to keep a highway clear than to open one that's blocked. Varying characteristics of snow and temperature are merely some of the factors that have to be considered in getting results.

When the warm spring days of March and April thaw the frozen ground and melt the snows, wild flowers and black prairies come to life. Streams swell bank-full, and muddy waters tear at bridges and highway embankments. A new and different maintenance battle begins, but that is another story. The snow fight, for a year at least, is over.



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AVOID SUBSTITUTES. If your equipment manufacturer cannot supply GATKE Brake and Friction Materials, write us.

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The many superior qualities are achieved by GATKE-developed methods of combining and moulding Woven Asbestos and Asbestos Moulding Compounds to finished dimensions.

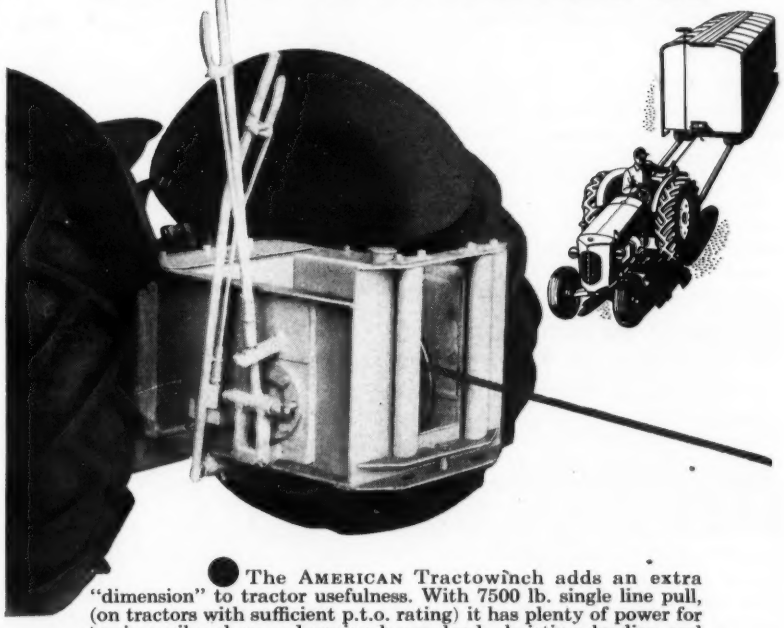
Furnished in Gear Toothed and Plain Disc Types in sizes to 48 inches in diameter and larger.

Gatke CORPORATION 224 N. La Salle St. Chicago 1, Illinois

Now...tractors pull standing still!

with the AMERICAN single drum

Tractowinch



The AMERICAN Tractowinch adds an extra "dimension" to tractor usefulness. With 7500 lb. single line pull, (on tractors with sufficient p.t.o. rating) it has plenty of power for towing railroad cars, dragging heavy loads, hoisting, loading and pulling, even in very close quarters. Developed after long study of the special problems involved, it is now a production item—fully perfected, field tested for use on industrial wheel type tractors.

Every feature of deluxe winch construction has been included. The Tractowinch is ball bearing equipped . . . has jaw clutch on drum, to permit free spooling . . . has powerful hand brake . . . fairlead rollers allowing sharp off-lead of cable to either side . . . and has drawbar built into frame for regular towing jobs. Available through your tractor distributor. Or write us direct for prices and literature.

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St. Paul 1, Minnesota

Please send Catalog 125-H-2, with details on the AMERICAN TRACTOWINCH.

Name_____
Company_____
Address_____
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A pivoting seat on Huber's new trench roller permits the operator to face his work at all times.

Light Trench Roller Equals a 10-Ton Unit

A trench roller for road widening, relocation, repair, and similar work is announced by The Huber Mfg. Co. of Marion, Ohio. It has a compression per linear inch equal to that of most 10-ton rollers, the manufacturer states. A feature of the unit is the operator's seat which swings around the steering post so that the operator faces the work at all times.

The roller is powered by a 4-cylinder air-cooled engine. The transmission provides two speeds in both forward and reverse motion. A hydraulic jack raises or lowers the outboard wheel to level the machine when working in trenches up to 13 inches deep. The locking pin, controlled from the operator's seat, holds the adjusting wheel at the desired height.

The Huber roller is equipped with a brake for service and parking; a 50-gallon-capacity sprinkling tank with mats on both rolls that run in the trench; and spring-tension scrapers on the rolls and adjusting wheel. The roller has a 90-inch wheelbase and a short turning radius. It can be furnished with a 16 or 20-inch-face compression roll.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 51.

Vibrator Attachment For Truck Spreaders

A vibratory attachment for materials spreaders is manufactured by A. E. Finley & Associates, P. O. Box 253, Raleigh, N. C. It is for use in the regulated application of fine aggregates, sand, gravel, ice-control materials, and other substances, either wet or dry. The Hight Uni-Spreader is designed to be attached to standard dump-truck tailgate spreaders, and one unit can be used with several spreaders.

The vibrator has a 2⅜-inch-diameter head and a length of 18⅝ inches. The manufacturer recommends that a 14-foot flexible shaft be used with it. Power is provided by a 1-cylinder engine mounted on a special bracket. The Uni-Spreader is 19⅛ inches in length, 8½ inches in width, and weighs 19 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 24.

Power Saw for Field Use

A portable power saw is the subject of a 4-page folder released by the Nordberg Mfg. Co., Chicago and Oklahoma Aves., Milwaukee 7, Wis. The Nordberg-Buday saw has a 10 or 12-inch-diameter blade, a 36 x 38-inch table top, and a maximum depth of cut of 4 inches with the 12-inch blade. It is powered by a 3.6 to 3.9-hp gasoline engine or a 1½, 2, or 3-hp electric motor.

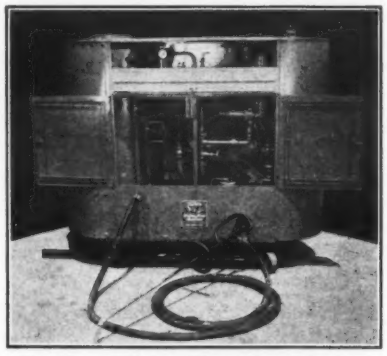
The catalog illustrates the Nordberg-Buday Model PT-AG and PT-AE saw in use for cross-cutting, angle mitering, rabbeting-tenoning, ripping, bevel ripping, and cutting plywood. In one photograph of the saw, each of its features is pointed out and described in a box of text. Photographs also show how the table is marked for quick settings for various sawing operations, how the table is turned, how the depth of saw cut is adjusted, how the unit can be loaded on a pick-up truck, and other features.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 83.

Multi-Fuel Cleaner

Steam cleaners in a wide range of styles and sizes are manufactured by Turco Products, Inc., 6135 S. Central Ave., Los Angeles 1, Calif. They are available in models for use with natural gas, manufactured gas, or fuel oil. And they can be permanently installed, or mounted on trailers or carried in trucks for portable use.

The Storm King can be used for high-pressure rinsing as well as for steam-cleaning operations. When used for steam cleaning it utilizes 180 gallons of water per hour; for high-pressure rinsing, it uses 240. Pressure of 150 pounds is maintained for either operation. The strength of the cleaning solution is regulated by a finger-tip control. Storage capacity of the solution tank is 64 gallons.



The Turco Storm King steam cleaners are available for use with natural gas, manufactured gas, or fuel oil.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 87.

Diesel-Engine Power Units

Descriptive literature on its line of diesel-engine power units has been prepared by R. H. Sheppard Co., Inc., of Hanover, Pa. It discusses the features of diesel engines in general, and of Sheppard diesels in particular.

This 12-page catalog, No. D100-4, describes the diesel engine and how it operates, the Sheppard fuel-injection system, and the cooling and lubrication systems. Cutaway drawings illustrate how the diesel engine works and how the Sheppard design is aimed at improved operation and performance. The catalog contains several photographs of the Sheppard engines in use on a wide variety of jobs, as well as the Sheppard production facilities.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 20.

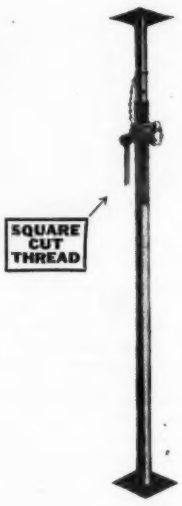
BE SURE THE

ACROW

ADJUSTABLE STEEL

SHORE

IS USED ON YOUR NEXT CONTRACT



TIME SAVING — because Acrow Shores are erected in seconds

ECONOMICAL—because they are practically indestructible and can be used an unlimited number of times

Completely positive action; no possibility of slip.

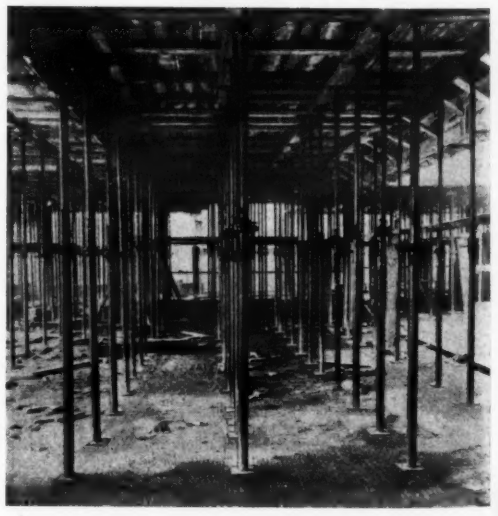
Accurate and fractional adjustment for height.

No jacks required, completely self-contained.

No loose parts.

No cutting, wedging or nailing required.

Negligible maintenance required and easy to transport.



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GEORGE A. FULLER CO. Contractor

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Further details on request

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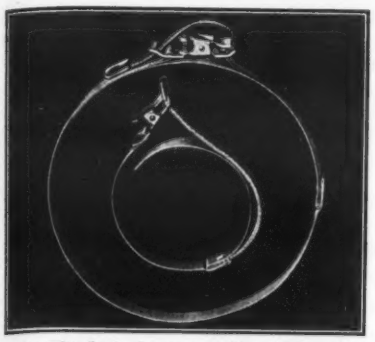


The Flexfast clamp provides fast positive clamping action over flexible conduits with diameters 1½ to 37 inches.

Clamp Is Adjustable

An adjustable low-pressure clamp for use with flexible conduits is announced by the Flexible Tubing Corp. of Branford, Conn. According to the manufacturer, the Flexfast clamp provides a fast and positive clamping action over diameters of from 1½ to 37 inches —each size having a wide range of take-up. The clamp consists of an overlapping one-piece non-rusting metal clamping band combined with a strap-and-buckle take-up.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 70.

Wood Association News

The American Wood-Preservers' Association has announced the appointment of a new Assistant Secretary, and disclosed plans for the immediate enlargement of the national headquarters. William A. Penrose is named Assistant Secretary to aid H. L. Dawson, Secretary-Treasurer of the AWPA since 1928. The Washington headquarters, and the office of the Secretary and the Assistant Secretary, are located at 1427 Eye St., N. W., Washington 5, D. C.

Picture-Story Booklet On Preformed Wire Rope

A booklet released by the Preformed Wire Rope Information Bureau, 520 N. Michigan Ave., Chicago, Ill., presents the story of wire rope in a novel and interesting manner. Prepared in the style of a comic book, this 16-page bulletin is entitled, "The Wonders of Wire Rope". It tells of the travels of a power-shovel operator and his family. They see the many uses of wire rope from deep in the earth to high in the sky. They see how wire rope is manufactured, and they hear the story of preformed wire rope.

This easy-to-read booklet is designed to tell the story of an important industrial product to men who are busy, to operators of equipment who do not ordinarily see literature of this kind, and to their children.

Copies of this literature may be obtained from the Bureau. Or use the enclosed Request Card. Circle No. 63.

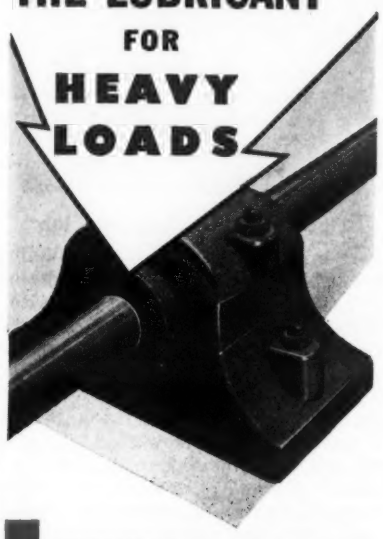
Safety in Use of Trucks

The increased use of trucks in the quarry, construction, and mine industries has resulted in a growing accident problem, according to a report prepared by the National Safety Council, 20 N. Wacker Drive, Chicago 6, Ill. To help meet this problem, the Council has prepared a new industrial data sheet on the safe use of trucks in these industries.

The data sheet covers the particular phases of truck operations that create the major accident problems, and recommends safe procedures to help reduce the hazards. It tells of the dangers in unexpected movement of trucks, in loading and unloading materials and supplies, and in getting on and off vehicles. It also stresses the importance of a continuing safety education program to keep employees aware of the dangers and the ways to avoid them. The data sheet was prepared by G. G. Grieve, Safety Engineer of the Council's Industrial Department.

Copies of this literature may be obtained from the Council at single-copy price of 15 cents, less in quantities.

THE LUBRICANT FOR HEAVY LOADS



LUBRIPLATE Lubricants are a paradox. They not only possess enormous film strength to withstand the heaviest loads but they function with minimum drag, hence conserve power. The "stay-put" quality of these unique lubricants means less frequent application and less lubricant consumption. Yes, they are most economical too. Write for particulars.

LUBRIPLATE

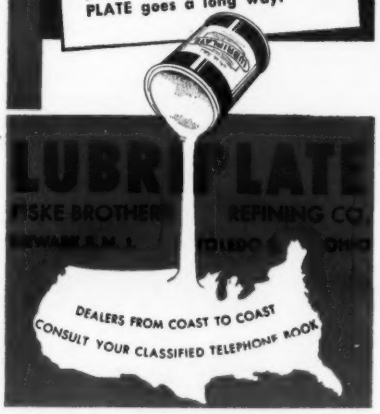
Lubricants definitely reduce friction and wear to a minimum. They lower power costs and prolong the life of equipment to an infinitely greater degree. LUBRIPLATE arrests progressive wear.

LUBRIPLATE

Lubricants protect machine parts against the destructive action of rust and corrosion. This feature alone puts LUBRIPLATE far out in front of conventional lubricants.

LUBRIPLATE

Lubricants are extremely economical for reason that they possess very long life and "stay-put" properties. A little LUBRIPLATE goes a long way.



A BLACKHAWK PIPE BENDER EARNS 3 WAYS

1 PIPE BENDING

Bends rigid conduit and pipe of all popular diameters. Saves need for elbows, couplings and extra cutting and threading.

2 MAINTENANCE AND PRODUCTION

Special attachments are available for the power unit which push, pull, bend, press, spread, and clamp — pull gears, lift machinery and lick scores of other jobs.

3 SPECIAL JACK

Compact Hydraulic Ram works in all directions — at any angle. A versatile, safe, remotely-controlled hydraulic jack.

• Your equipment can't produce profit when it's not at work. It's just smart business to choose tools that do a maximum amount of work. A Blackhawk Porto-Power Pipe Bender does MORE than bend pipe. It also uses the spare hours between pipe-bending jobs to do dozens of other profitable shop operations. Buy the pipe bender that does give you "extra" utility — Buy a Blackhawk from your Blackhawk Industrial Supply Distributor.

FOR INCREASED PROFITS . . . YOU CAN NOW CONVERT YOUR HAND-OPERATED PIPE BENDER TO POWER OPERATION

New P-182 Electrically-Driven Hydraulic Pump
Here is a real "profit-package" for you. This simple fast conversion brings you speed, power and greater economy. The P-182 triples ram speeds—slashes pipe bending time—eliminates fatigue. It is a complete package containing pump, reservoir, valves and controls.

ONE MAN OPERATION

With the amazing new P-182 Electrically-driven hydraulic pump one man can easily bend any size of pipe. Single control knob leaves hands free for measuring, etc. Get full details on the new P-182 from your Blackhawk Industrial Supply Distributor.

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BLACKHAWK

Here's the new CON-VAY-IT Concrete Special!

It's unsurpassed in its ability to speed up the movement of wet concrete from mixer to forms. With CON-VAY-IT Special you'll pour concrete faster, and at but a fraction of your normal labor cost. Available with either gas engine or electric motor drive.

Construction men in all parts of the country are using this highly efficient Concrete Conveyor with great success . . . and claim it has saved them many thousands of dollars annually. You should know about CON-VAY-IT Special — write for details TODAY.

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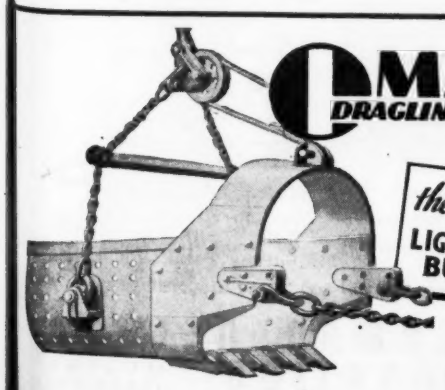

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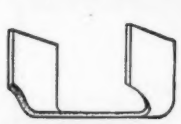
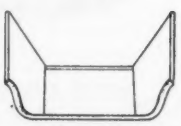
the Original LIGHTWEIGHT BUCKET

First in the Field! with features like these

HIGHER ARCH
Gives greater clearance for digging and dumping. Carries a bigger load.



CONTINUOUS LIP
Special tough rolled alloy steel extends to bucket top on both sides. Strengthens the whole front end.



WEDGE SHAPE
Digs easier—dumps cleaner. Fills with a shorter pull—load slides out through the wide arch.

DRAKE-WILLIAMS-MOUNT • OMAHA, NEBR.

Bomber Repair Hangar Sets New Size Record

(*Continued from page 6*)

and it is expected that this will have a modulus of elasticity of about 3,000,000 psi after 28 days. Support framing under the great dome is retained in place until the concrete develops a modulus of elasticity of 2,000,000 pounds psi, and this result is constantly checked in the field by the representative of the engineering firm.

Roberts & Schaefer Co. specializes in the solution of problems connected with wide-span monolithic-concrete structures. The Hershey Sports Arena at Hershey, Pa., which covers an unobstructed area of 245 x 356 feet, was designed and engineered by this firm.

The Rapid City hangar will have a clear inside of 340 x 300 feet. About 616 Raymond concrete-filled steel shell bearing piles carry the load of the footings and absorb some of the enormous lateral thrust. Thirteen sets of tension ties, each set containing six 2½-inch steel rods pre-stressed to a tension of 48½ tons per rod, are placed at regular intervals from footing to footing below the concrete floor slab. When the prestress load is put on these steel rods by big 80-ton hydraulic jacks, the rods actually lengthen about 3½ inches.

The hangar will have a 300-foot clear door opening, with twelve 25-foot door leaves 40 feet high operated by electric motors, and the doors traveling on steel rails. Above the main door a tail-gate opening 50 feet wide and 20 feet high will permit the big bomber tails, as high as three-story buildings, to enter the hangar.

Over 95,000 linear feet of 1½-inch all-welded steel pipe—more than 18 miles—will carry hot water from a central boiler plant throughout the floor area to supply radiant heat to the inside of the building. These pipes even extend out in front of the doors about 5 feet, and will keep any winter snow melted away which might otherwise interfere with the opening of the massive doors.

The main floor slab is composed of 18 and 23-inch reinforced concrete, set on 18 to 24 inches of highly compacted granular base and capable of standing 150,000-pound wheel loads. One small part of the hangar, where operations offices are to be located, has a 5-inch concrete floor.

The great domed roof, which rises 90 feet above the floor at its highest point, is a maximum of 7 inches thick. At the very top it is only 5 inches thick, reinforced with deformed steel bars throughout. While the roof is already rainproof as is, a 1-inch insulating blanket will be put over the concrete, and a 6-ply asphaltic composition roof will complete the top from the outside.

At intervals of 25 feet, arched reinforcing ribs follow the roof line across the building. Extending 5 feet above the roof deck, they act as stiffeners. The under side of the roof inside the building is slick and clean. The big lighting fixtures, which will be installed under the contract, will be hoisted and lowered by cable power so they can be serviced.

All materials inside the hangar are to be fireproof. The contract includes the VVHB hangar itself and the installation of sewer, storm-drainage, water, electrical, and heating facilities.

Change Order Hampers Job

As originally designed, the building was to be built without the cross tension ties, because shear strength of the soil at the original location was considered great enough to hold the lateral thrust of the foundation footings. The original location was not suitable to the overall field plan, however, and the hangar location was then changed. At the new site, soil conditions were different and tension ties and piles were required to resist the horizontal thrust and vertical loads. Although Steenberg's men were on the scene, some delay was experienced because of the investigations and design changes which had to be made.

The actual construction of the hangar involved some real problems, many of which were met at once, and some of which had to be wrestled with for weeks before they were solved. How the hangar was actually built is the subject of the companion article.

Subcontracts Let

Steenberg Construction Co., faced with a shortage of skilled labor at Rapid City, elected to subcontract much of the work it might ordinarily have done if it had not had to import as many key men as possible to alleviate the local situation.

Plumbing and heating were let to V. J. Hagan Co., Inc., of Sioux City. All electrical work, including the installation of big transformers, went to the Collier Electric Co., Ltd., of Denver. Excavation, sub-base, and structural backfill were sublet to Otto B. Ashbach & Sons, Inc., of St. Paul.

Holman Erection Co. of St. Paul got the subcontract for erection and placement of all structural and reinforcing steel. Alphonse Custodis Chimney Construction Co. of St. Paul will build the 95-foot chimney at the boiler room. Midler Heating & Sheet Metal Co. of St. Paul will install all sheet-metal work, and Cook Paint & Varnish Co. of Omaha will furnish and install the 5,700 window panes in the building.

The massive doors at each end of the hangar are to be furnished and installed by Byrne Doors, Inc., of Detroit. Concrete for the entire building is being furnished and placed by Rapid City Concrete Contractors, Inc., of Denver, made up of Colorado Pre-Mix Co. and the Ready-Mix Concrete Co. of Denver.

The big building poses such quantities as 15,000 cubic yards of concrete, 259 tons of steel in the tension ties, 210 tons of structural steel, 616 concrete

(*Concluded on next page*)

• For Operating Power Tools • Floodlights • Field Repair Shops • On Service Trucks • Paving Machines • Power Shovels • Earth Moving Equipment, etc.

"U.S." BUILDS A COMPLETE LINE of Gasoline and Diesel Electric Plants up to 140 KW—for stand-by, continuous duty, battery-charging, and portable uses. Skids, rings, porter bars, and trailer mountings available. Write for literature, stating type of unit and capacity required.

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Factory representatives strategically located throughout U.S.A. and Canada.

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Asphalt and Tar Kettles
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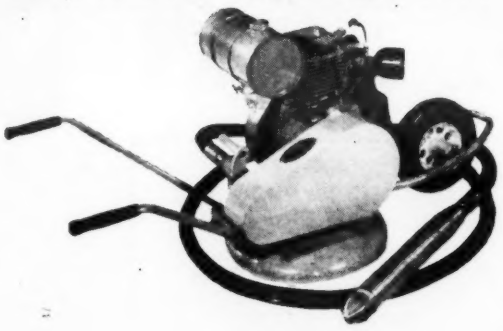

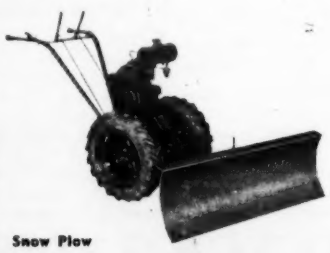

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Marvel Equipment Co.
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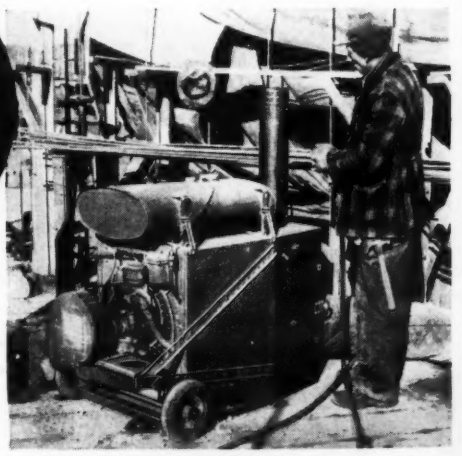
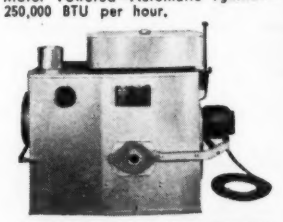
HEAT
WHERE YOU WANT IT--- WHEN YOU WANT IT---
without waste



Also Available

New Herman Nelson De Luxe Model Portable Heater—Oil Burning—Electric Motor Powered—Automatic Ignition—250,000 BTU per hour.



New Herman Nelson Economy Model Portable Heater—Oil Burning—Electric Motor Powered—Low First Cost — 125,000 BTU per hour.

THE ORIGINAL HERMAN NELSON GASOLINE-BURNING PORTABLE HEATER

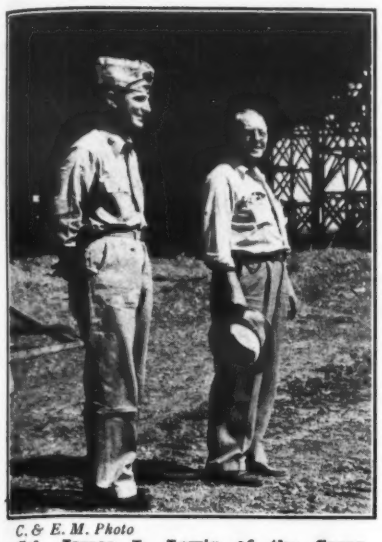
- **Provides Quick, Clean, Safe Heat—*without* soot, fumes or open flame!**
- **Abundant *fresh*, heated air — *forced* to areas where most needed!**

These time-tested, job-proved Portable Heaters step up winter production by eliminating delays caused by cold weather. Can be used for countless applications requiring temporary or emergency heat. Especially suited to jobs requiring a self-contained, self-powered heating unit. Full 250,000 BTU per hour capacity — enough to heat three ordinary five-room houses — yet no bigger than a kitchen stove!

Write for Interesting Free Booklet on "COST CONTROL"

THE HERMAN NELSON CORPORATION MOLINE ILLINOIS

SINCE 1906 MANUFACTURERS OF QUALITY HEATING AND VENTILATING PRODUCTS



C. & E. M. Photo
Col. James L. Lewis of the Corps of Engineers (left) poses in front of the big Rapid City Air Base hangar with Holger Nielsen, General Superintendent for Steenberg Construction Co.

piles 18 to 28 feet long, 95,000 linear feet of radiant heating pipe, 749 tons of reinforcing steel, and 5,700 window panes. Some 500,000 board-feet of lumber alone is in the timber falsework structure which supports the roof pours, and it was built at a cost of $150,000.

Personnel

The job is being administered under the supervision of Colonel Louis C. Prentiss, Omaha District Engineer for the Corps of Engineers, with Lieut. Col. James Lewis in charge of field operations, assisted by T. N. Cosgrove, Project Engineer. The job is under the general supervision of Maj. Gen. Lewis A. Pick, Division Engineer, Missouri River Division, Corps of Engineers, who also is directing the Corps' part of the big Missouri Basin project.

Contractor operations are under the direction of General Superintendent Holger Nielsen of the Steenberg organization, a specialist active in the building field for 31 years. Subcontractor superintendents for the various other phases include Robert Smith on concrete, Harry Bruns on plumbing, Ray Gray on electrical work, Harold Angel on excavation, and Walter Karlen on structural erection. Young Paul Steenberg is on the job, and E. B. Greenwood represents Roberts & Schaefer Co., Engineers.

Reproducer Features A Voltage Regulator

A reproducing machine for moderate-volume production is announced by Charles Bruning Co., Inc., 4754 Montrose Ave., Chicago 41, Ill. The Model No. 21 BW Whiteprinter can be used for reproducing engineering drawings in ink or pencil, and office forms printed or typewritten on translucent or transparent material.

The Model No. 21 is continuous in operation and can expose and develop cut sheets or roll stock up to 42 inches in width and in any length. Printing speeds range from 6 inches to 4 fpm. Developing speed has been set at 10 fpm to enable the operator to coordinate the exposing and developing operations.

A feature of the Whiteprinter is its built-in constant-voltage transformer. This is designed to enable the 1,200-watt mercury-arc lamp to work at its optimum rating—within a 30-volt range—regardless of line-voltage changes.

The developing unit consists of grooved dual-application developer rolls which, with the aid of a third roll, apply a minute film of BW developer solution to both sides of the BW medium simultaneously. This is said to assure proper chemical balance of the developer solution. The Model 21 will handle all regular BW paper—light, medium, and card-weight—and BW transparent paper, BW cloth, and BW matte film. It will develop black, blue, red, or brown lines on white backgrounds and on BW green, pink, or yellow-tinted papers.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 10.

Welded Connection Units Speed Erection of Steel

Engineering data on the Saxe system of welded connection units for the erection of welded steel structures are offered in booklet form by J. H. Williams & Co., 400 Vulcan St., Buffalo 7, N. Y. Feature of the Saxe system is its use of the hook-and-eye principle; the system is said to be self-aligning and to lock the steel members securely in position. The book was prepared by Van Rensselaer P. Saxe, a consulting engineer of Baltimore, Md.

The booklet introduces the subject by discussing the advantages claimed for welded construction. It then describes the Saxe seats and clips which are designed to speed steel erection. It discusses the various connections for use with members normally connected by welding methods, and shows how the seats and clips are applied. The manual presents tables and technical data for use in the design procedure for various welded joints. And it concludes with 26 pages of engineering drawings which give complete details on typical applications of the Saxe seats and clips in the assembly of welded steel structures.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 122.

Simplicity
that pays off!

The simplicity of Fairbanks-Morse magneto ignition—no battery or generator, etc.—means lower upkeep expense, easier trouble-shooting, fewer delays, year in, year out.

. . . Your Magneto Ignition by

FAIRBANKS-MORSE

Sold and Serviced by Over 2,000 Experts

DIG REAL DIVIDENDS

WELLMAN
Williams Type
Welded Buckets

Operators prefer the Wellman Bucket for its balance, easy handling, and digging power. Owners prefer the Wellman Bucket for its bigger payloads, lower maintenance cost. These features are not accidental. Wellman pioneered in welded construction of rolled steels which make these buckets lighter, stronger, for greater yardage at lower costs. In all types and sizes, you'll do better with a Wellman!

There's a Wellman Bucket for every service

THE WELLMAN ENGINEERING COMPANY
7012 CENTRAL AVENUE CLEVELAND 4, OHIO

WHAT THOSE HIGHWAYS NEED IS A "SPRAY MASTER" ON THE JOB

"Spray Master" Distributors are designed for low cost, efficient Road Building and Maintenance. Operating time is cut to a minimum. With a 24 ft. Vacuum Flow Full Circulating Spray Bar asphalt, tar, emulsion or road oil can be sprayed with razor like precision. *No gadgets to mess with* either, the "Spray Master" *has one valve* for starting and stopping the spray. Manual operating individual nozzles can reduce the spraying width in a few seconds. Low cost and efficient operation is the watchword of the Littleford "Spray Master." The Faster Heating System, Hydraulic Spray Bar Adjustment, Circulating by Vacuum not pressure, Heat Chamber, are only a few of the advantages the "Spray Master" gives as standard equipment. Made in sizes from 800 to 3000 gal. truck mounted or frameless semi-trailer. For Better Roads use the best equipment, the "Spray Master" Distributor. Write for Bulletin No. 14.

MANUFACTURERS OF
"Spray Master" Pressure Distributors

"Tankar" Steam Heaters	Highway Brooms	Asphalt Supply Tanks
"Kwik-Melter" Roofers Kettles	Tool Heaters	No. 101 Utility Spray Tanks
Trail-O-Rollers	Trail-O-Distributors	84-HD Asphalt Kettles

BLACK TOP ROAD MAINTENANCE EQUIPMENT SINCE 1900
LB LITTLEFORD

LITTLEFORD BROS., INC.
485 E. Pearl St., Cincinnati 2, Ohio

The Tennant K machine is removing curing material from a concrete floor. A revolving steel-wire brush cuts it from the floor and hurls it into a hopper, while a vacuum fan sucks up lighter dust and particles.

Floor Scraped Clean Of Curing Compounds

A machine for removing concrete-curing materials from floor surfaces is manufactured by the G.H. Tennant Co., 2530 N. 2nd St., Minneapolis 11, Minn. The revolving brush is designed to cut the material loose and hurl it into a built-in hopper. Light dust and small fragments are picked up by a vacuum fan, the manufacturer states, making it possible to clean the floor in one operation. And the forward rotation of the 16-inch drum-mounted brush imparts a finished surface to the floor as it cleans, the company points out.

The Model K is powered by a 6-hp gasoline engine. The accelerator control provides speeds of 800, 1,200, and 1,500 rpm to the brush. Standard brushes are available in 20, 30, or 39 gage. The hopper will hold from 50 to 70 pounds of soilage. The Model K is 32 inches in length without the handle, 24 inches in width, and 36 inches in height to the top of the inflated bag. It weighs 389 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 90.

Oil Co. Moves Sales Office

American Liberty Oil Co. announces that the offices of its Sales Department formerly located at 1008 Magnolia Bldg. in downtown Dallas have been moved to the company's general offices at 40 Highland Park Shopping Village in Dallas, Texas.

Four Diesel Engines Rated Up to 500 Hp

Four new diesel engines will soon go into production at the plant of the Caterpillar Tractor Co., Peoria 8, Ill. They are made in 8 and 12-cylinder models and are designed to permit power take-offs of 100 per cent at either end of the engine. They have a 60-degree V-type arrangement. Full-load speeds range from 800 to 1,200 rpm. The bore and stroke is 5¾ x 8 inches for all four models.

The D397 is a V-12 engine with a maximum output of 500 hp, a rated output of 450 hp. and a continuous output of 400 hp. The D386 is a V-12 engine with a maximum output of 400 hp, a rated output of 360 hp, and a continuous output of 320 hp. The D375 is a V-8 engine with a maximum output of 334 hp, a rated output of 300 hp, and a continuous output of 268 hp. The D364 is a V-8 engine with a maximum output of 267 hp, a rated output of 240 hp, and a continuous output of 214 hp.

All four engines have a width of 48¼ inches and a height of 70½ inches. The V-8's are 88 5/16 inches long, the D386 is 108 9/16 inches long, and the D397 is 112½ inches long. The V-8's have a piston displacement of 1,662 cubic inches; the V-12's, 2,493 cubic inches. Lubrication, fuel injection, cooling and starting systems, governor flywheel housing, crankshaft and bearings, connecting rods, pistons and rings, cylinder liners and head, valves, and cylinder block are similar in all four engines.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 36.

Sand and Gravel Pumps

A 4-page folder on the Model XA sand and gravel pumps is available from the Kansas City Hay Press Co., 801 Woodswether Road, Kansas City, Mo. Features of these pumps are their front and back side plates which are secured without bolts in order to simplify disassembly and the replacement of parts worn down by abrasive materials. The manufacturer points out that the absence of bolt holes in the shell lengthens its service life; and the tolerance of 1/64 inch which is maintained between the impeller and suction liner serves to prevent the entrance of abrasive materials.

Photographs in the folder show a side view of the pump, an exploded view of the pump's working parts, a view of the suction end, and the complete pump. Specifications and dimensions are listed for all three sizes in which the XA is manufactured—6, 8, and 10-inch. Also described are the shell, liners, impeller, shaft, and bearings, and the Hi-Chro-Hi alloy from which all wearing parts of the pump are cast.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 121.

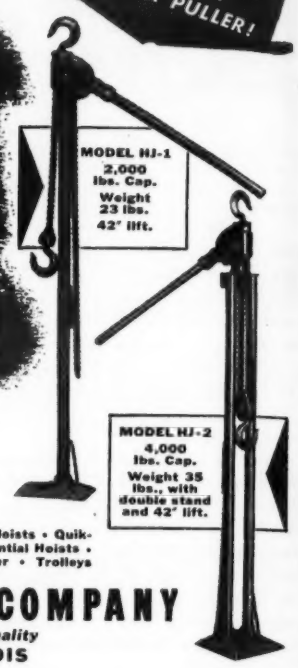
"Essential Equipment" Say Construction Men

COFFING HOIST-JACKS IT'S A HOIST! IT'S A JACK! IT'S A PULLER!

"Our men could not operate without the Coffing Hoist-Jacks—a day never passes but what they are used.

"They are invaluable in repairing, in trestle work to straighten up piling for capping and to space caps for stringers. They are also used in cofferdams to straighten struts that are displaced by the excavator or pile leads or hammer."

(Signed)
W. D. Andrews,
Contracting Construction Co.
Danville, Illinois



Get more work done, faster and safer with the versatile Coffing Hoist-Jack. Use it with stand as a jack or without stand as a hoist or puller. Tested to 100% over rated capacity, Hoist-Jacks are built for heavy duty jobs, easy operation and maximum safety. For complete information, write today for Bulletin CHJ-1.

OTHER COFFING PRODUCTS: Safety-Pull Hoists • Quik-Lift Electric Hoists • Lead Binders • Differential Hoists • Spur Geared Hoists • Mighty-Midget Puller • Trolleys

COFFING HOIST COMPANY
A Quarter Century of Quality
DANVILLE, ILLINOIS

for TRUCKS for TRACTORS

THE OWEN LOADER
a *complete* unit for material handling

One man and an Owen Loader can dig and load one yard per minute! When installed on a truck you load, haul and dump with one unit . . . one man! The Owen Loader will speed any job, pay for itself . . . and make a profit for you.

1½-yd. snow bucket and bulldozer blade available as extra equipment. Write to us for specifications on the Owen Truck Loader or see your Case Industrial Dealer if interested in Owen Tractor Loaders.

Sole Licensee under Owen patents.

OWEN LOADER, INC. BOX 3282, STATION "F" ATLANTA, GEORGIA

KINNEY BITUMINOUS DISTRIBUTORS

EASY CONTROLS FOR SPEEDY APPLICATION

The Kinney Distributor provides complete control right at the operator's fingertips. A large handwheel gives full and accurate sidewise control of the spray bar . . . eliminates overlap of strips . . . permits faster truck speeds. One simple, three-way valve controls the entire operation of the Kinney Distributor—from loading to circulating to the actual spraying. This single valve, either manually or air operated, is the simplest control on the market; it's speedy, leakless, efficient. The Kinney Distributor handles all grades of bitumen used in road work: tar, asphalt, road oil, cut back, and emulsions. Its Jacketed Rotating Plunger Pump works with meter-like accuracy and finishes each job exactly to specifications.

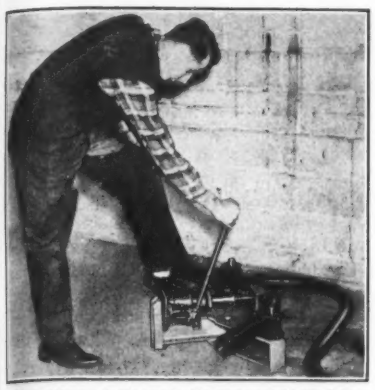
Write for new Bulletin A-48.

KINNEY MANUFACTURING CO.
3531 WASHINGTON STREET
BOSTON 30, MASS.

New York • Chicago • Philadelphia
Los Angeles • San Francisco

We also manufacture Vacuum Pumps, Liquid Pumps and Clutches

All controls right at operator's fingertips



Together, jack and frame of this hydraulic pipe and bar bender weigh 83 pounds. Electric Cord Co. makes it.

Pipe-Bending Jacks

A hydraulically powered pipe and bar bender is announced by the Electric Cord Co., 30 Church St., New York 7, N. Y. This tool is designed for portability, having a combined weight for the jack and frame of 83 pounds. The removable hydraulic jack is hand-pumped and can also be used for other purposes. The unit is supplied complete with ¾, 1, 1¼, 2, and 2½-inch dies.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 89.

Steel Roller Drive Chains

Steel thimble-roller drive chains for all classes of service are listed in a catalog distributed by The Jeffrey Mfg. Co., 960 N. 4th St., Columbus 16, Ohio. Among the styles in which these drive chains are built are straight-link; offset-link; and offset-type finished roller chains in single, double, or triple strands. Also manufactured by Jeffrey is a complete line of sprocket wheels for use with these chains.

The 56-page catalog, No. 808, includes a drive-chain index which lists ultimate and working strengths, pitch, weight, speed of operation, and the sprockets each chain will fit; horsepower rating tables are given for the more popular sizes of chains for the various sizes and rpm of driving sprockets; formulae for determining the number of links of chain in a drive, depth of sag for slack side, tension in slack side, and working loads; and prices.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 126.

Literature Is Released On Mixers and Finishers

Four pieces of literature on mixers and finishers are being distributed by The Jaeger Machine Co., 701 Dublin Ave., Columbus 16, Ohio. Catalog TM-8 contains 30 pages of information on the Hi-Dump truck-mixers; Catalog M-8 has 26 pages on the Jaeger trailer mixers; Bulletin FH-8 is an 8-page catalog describing the Type H transverse finisher; and Bulletin FW-8 describes the Jaeger 2-screed widening finisher.

The Hi-Dump mixer is made in two styles—end-loading and top-loading—in 2, 3, and 4½-yard sizes. The end-loading type is also made in a 5½-yard size. All of these units are described in detail in Catalog TM-8. Catalog M-8 lists the features of the 3½-S Speedy end-discharge tilting mixer; the 3½-S Auto-Loader end-discharge non-tilting mixer; the 6-S, 11-S and 16-S Speedline skip-shaker loader mixers; and the Power Hoe plaster-mortar mixer.

Among the features of the Type H transverse finisher listed in Bulletin FH-8 are the main frame, end-shoe assembly, crown-change operating wrench, central 4-speed transmission, grouped controls, 23-hp engine, self-contained side trucks, and the positive 4-wheel drive. The sheet about the 2-screed widening finisher lists several features of this unit including the high and low-range gear box, the 4 to 6-foot width control, the screeds, frame, motor, transmission, traction wheels, etc.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. For the bulletin on the Hi-Dump truck-mixers, Circle No. 56; for the trailer mixers, No. 57; for the transverse finisher, No. 58; and for the widening finishers, No. 59.

SPEED OPERATION for Snow Plows and Road Machinery with the . . . .

MONARCH New and Improved HY-LO-JACK

Fan Belt Driven

Power Hydraulic Control

Lifts plows ten times faster than hand pump. Cab-controlled. Easy installation on new or existing equipment. Priced for the most conservative budget.

WRITE FOR CIRCULAR H-75

MONARCH ROAD MACHINERY, COMPANY 327-329 Front Ave., N.W. Grand Rapids 4, Michigan

Specify STRAIGHT FRAME CONSTRUCTION

for ALL-WEATHER "STRAIGHT-THROUGH" SERVICE

DUPLEX

TRUCK COMPANY

LANSING 4, MICHIGAN

Duplex Straight Frame Construction means much easier, much more dependable plow and scraper mounting!

PROTECTED DEALER

Franchises Available in Some Areas

CUMMER ASPHALT PLANTS

COMPLETE PLANTS FROM 60 TO 100 TONS PER HOUR FURNISHED AS ILLUSTRATED

Other Smaller Plants Portable Mounted on Pneumatics

PROMPT SHIPMENT ON ALL SIZES FEEDERS—STORAGE BINS—PUMPS—TIMERS AND OTHER UNITS AS REQUIRED

Literature Upon Request

CUMMER TWO-FIRE DRYER and 40-TON BIN UNIT

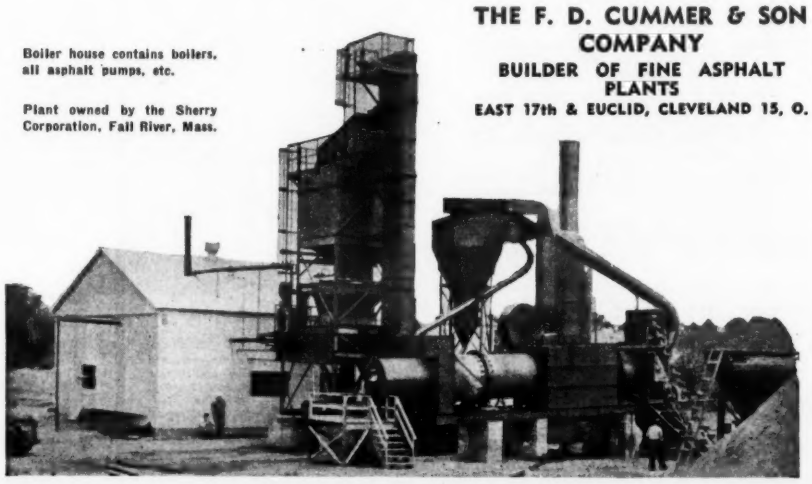
PHOTO BELOW SHOWS TYPICAL INSTALLATION

60 tons per hour capacity—located at Fall River, Mass.

Completely equipped with dust collection unit discharging into boot of hot elevator. Plant is equipped with 3-compartment cold storage hopper and feeder for regulation of feed into the dryer. 4' x 10' vibrating screen, 40-ton bin, 1-ton mixer, dial scales complete with all motors and drives.

Boiler house contains boilers, all asphalt pumps, etc.

Plant owned by the Sherry Corporation, Fall River, Mass.



THE F. D. CUMMER & SON COMPANY

BUILDER OF FINE ASPHALT PLANTS

EAST 17th & EUCLID, CLEVELAND 15, O.

Check the Red Request Card!

For further information on the new equipment, new materials, and new literature described in this issue of Contractors and Engineers Monthly, check the item number on the enclosed Red Request Card (see pages 16 and 92). No obligation, of course, and we will forward your request directly to the manufacturer.

Contractors and Engineers Monthly

470 Fourth Ave.

New York 16, N. Y.

What We Need Is Human Engineers

To Pick Key Men, Leaders For His Organization, an Executive Must Become An Expert Human Engineer

✦ AS a nation we are deeply and necessarily concerned with industry—the manipulating of men and materials. And since we are a nation of technical engineers and technical experts, we are already fairly skilled at dealing with the known factor in that equation—the materials. Yet it may fairly be said that if we are to continue our accomplishments and progress, we must acquire equal skill at dealing with the unknown factor in the industrial equation—men.

How to put men to the best possible use is one of the knottiest problems that confronts the executive in this post-war era. No executive escapes it—least of all, perhaps, the contractor or the highway-department official. And no executive can long afford to let his knowledge of "techni-social" problems lag behind his ability to cope with technical or engineering ones.

The trouble is that the behavior of materials can be fairly accurately predicted and controlled, but the behavior of men as individuals—apart from a mob—cannot. The workers of industry think, act, create, each in his own pattern. Some can lead others, some can only follow. And standards of intelligence are as variable as the population.

Now the technical knowledge which the engineer has is of little use when it comes to spotting intelligence or ability or leadership in men, and diverting it into the stream that can utilize it best. That takes another kind of expert altogether, the Human Engineer. And it follows that the executive—the contractor along with his superintendents and foremen, and the head of a highway department along with his engineers—must be or must shortly become a human engineer if he is to choose his associates wisely, place and promote them wisely, and generally prosper with an organization of round pegs in round holes.

Obviously no executive can hope to qualify in a day as a human engineer. But he *can* begin at once to consider what capabilities he is looking for in his key men.

Choosing Leaders

In the first place, is he looking primarily for technical skill or skill in handling men when he picks leaders to work within his organization? When these qualities are combined in one man—when the contractor comes across a superintendent equally skilled in the various phases of construction and in guiding men—the task is easy. However, this phenomenon occurs but rarely. The executive must frequently make a choice.

If any rule is to be followed in making that choice, it should be a flexible one somewhat to this effect: the smaller the group of men to be handled, the greater should be the working skill of the leader; and as the number of men in the group increases, so should the leader's knowledge of the human element.

To put it more concretely, the nearer a foreman or highway-department engineer is to working by himself, the higher should be his working skill. But the superintendent who is called on to lead a hundred men must also be an organizer and a psychologist.

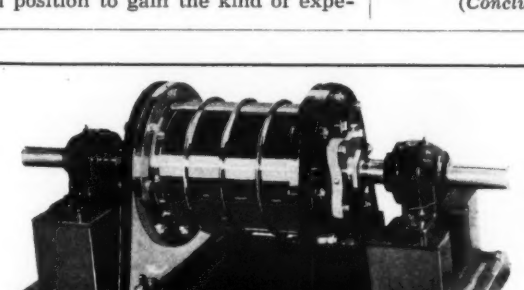
The small-group leader must be able to instruct his own personnel in their work by showing them how to do it, while he leans on his superiors for advice about human problems that arise in the group. But as his knowledge of human psychology increases, as he himself becomes more of a human engineer, so will his capacity increase for handling more men and higher executive positions.

The use of such a sliding rule should result in a staff of key men properly graded to suit their individual jobs, yet in a position to gain the kind of experience necessary for their promotion.

Physical, Mental, Moral Qualities

The average executive regards the appraisal of the physical condition of his prospective leader as the easiest of tasks. A physical check-up soon indicates the man's physical stamina. But in many cases a man with slightly-below-average physical make-up may rank high in intelligence, determination, and aggressiveness. If the executive does not weigh physical fitness against mental fitness, he may have among his leaders all brawn and no brain, or vice

(*Concluded on next page*)



POWER ELECTRIC DIESEL GASOLINE

Write for Bulletin No. 37

Use water instead of costly fuel to liquefy your asphalt.

You can manufacture your own emulsion

EASILY AND ECONOMICALLY.

McConnaughay

EMULSIFIED ASPHALT PLANTS AND PROCESSES

WEST LAFAYETTE, INDIANA

"WE CLEAN A ROAD GRADER IN 8 HOURS with HYPRESSURE Jenny HAND CLEANING USED TO TAKE 80 HOURS"

HYPRESSURE JENNY CLEANS

by a highly atomized mixture of steam, hot water and cleaning compound applied under pressure through an adjustable spray gun. Mud, muck and grease are removed almost instantly. Hypressure Jenny is portable . . . easy and economical to use. Ordinary labor can operate it. Full-powered, all-purpose, heavy-duty models are available from $388 to $555.

Hypressure Jenny cleans all types of construction equipment . . . *10 times faster than it can be done by hand.*

Here's what some other construction equipment users say about Hypressure Jenny steam cleaning:

"We save $25.00 on each piece of equipment we clean with Hypressure Jenny."

"Hypressure Jenny steam cleaning helps us locate fractures and trouble on bulldozers before they break down."

"One man with Hypressure Jenny can clean equipment in one hour that formerly required 18 hours to clean by hand."

If you would like to know how Hypressure Jenny can save *you* time and money, just mail the coupon. There is no obligation.

REQUEST FOR SURVEY

Hypressure Jenny Division
Homestead Valve Manufacturing Co.
P.O. Box 30K, Coraopolis, Pa.

We employ ..... mechanics on equipment repair work.
We recondition ..... pieces of ☐ equipment, ☐ trucks each month.
We clean ..... pieces of equipment, ☐ trucks each month.
We are interested in cleaning ☐ floors, ☐ walls, ☐ windows.
Based on above facts, please show us the savings or extra profit Hypressure Jenny can produce.

Company .....
By ..... Title .....
Address .....
City ..... State .....

HYPRESSURE JENNY DIVISION
HOMESTEAD VALVE MFG. COMPANY
"Serving Since 1892"
Coraopolis, Pa.

IN CHICAGO IT'S DUMPCRETE CONCRETE* AGAIN!

DUMPCRETES HAUL 14 MILES IN CHICAGO TRAFFIC

The Imperial Ready Mix Company's 14 Dumpcretes are busy hauling top-quality air-entrained concrete in and around Chicago.

The above photo shows a Dumpcrete pouring foundation piles at the new A. B. Dick Co. plant after a 14-mile, 50-minute haul.

By controlling the mix at the central plant, every load is uniform. Each has just the right amount of air to maintain top-to-bottom uniformity. No additional air is beaten into this "controlled mix" by the non-agitating Dumpcretes during the haul . . . so the delivered concrete is all according to specification.

The Dumpcretes save money too. They cost less to buy and less to run.

Every concrete man wants to deliver better concrete at lower cost. Write for complete information today.

The Dumpcrete Body

Lightweight, watertight, loads fast, dumps fast or slow, places anywhere, costs less to buy and run. Ideal for hauling aggregate, coal and earth.

* Dumpcrete Concrete is central-mix air-entrained concrete hauled and placed with the speedy, low-cost Dumperete. Provides top-quality, plastic, workable and non-segregating concrete, saving up to $1.00 per yard.

DUMPCRETE DIVISION
MAXON CONSTRUCTION CO., INC.
506 Talbott Bldg., Dayton 2, Ohio

versa.

The executive should look for an open mind in the men he picks to direct other men. For an open mind implies the ability to recognize mistakes and take steps to correct them. It also implies a willingness to study—essential today when machines and methods are improving so rapidly that those who are not willing to keep up with them are soon left hopelessly out of date.

The will to study is, in turn, a by-product of another quality or attitude which we call ambition. "Does this man want to assume greater responsibility?" the executive should ask himself as he considers promoting someone to fill a supervisory position. If he doesn't, if he is satisfied to go so far and no farther, he is not suitable for promotion. If he feels there is nothing left for him to do but coast, the danger is that the only direction in which he can coast is downward. But if he does want more responsibility, he will press for greater and greater efficiency from the group he directs—to satisfy his own pride in his work and to secure recognition from his supervisors.

As vital as ambition in a leader is enthusiasm, the driving power to proceed with zest and vigor in the face of adversity. And fortunately for the executive choosing his leaders, enthusiasm is easy to detect where it exists. It advertises itself in every word and action of the individual.

More difficult to determine is a man's moral caliber. Yet habits morally unhealthy break down a man's efficiency, render him incapable of leading others —and the executive must evaluate his potential leaders in that light too.

Executive Must Also Teach

No small part of the executive's role as human engineer is the instruction he gives his associates, especially by his example. His decisions, actions, manners are constantly under observation by his men—particularly by the fellow in line for promotion, who observes how his superiors handle different problems so that he too will be equipped to handle them when he has to. Any executive who realizes this will live up to his authority, act promptly, talk responsibly, and conduct himself in a way that commands respect.

The executive, too, will observe his key men closely. It is to be expected that they will make mistakes, and it is up to him to help them correct those mistakes. But the contractor will never reprimand his superintendent, or the superintendent his foreman, in front of other employees. A man must retain his prestige in order to continue directing other men. It is far better for the executive to call him aside or to his private office, where the correction can be just as effective yet will not rob the man of the prestige he gained when he was put in charge of other men.

And a final reminder to the executive about his functions as a human engineer: his instructions to his associates and key men must be explicit, for verbal instructions hurriedly given and not repeated are all too easy to misunderstand. He should work for a good command of the English language and induce his key men to do so too—not that they may become glib, but that they may use words exactly and give instructions which are brief but complete, impossible to misunderstand.

Command your language and you command respect. And it is respect surely—the executive's respect for his men and theirs for him—that is the basis of human engineering.

Guide for Lubrication

A revised and up-to-date capacity and recommendation index designed as a guide to correct lubrication of trucks, buses, and commercial cars, has been brought out by the Sinclair Refining Co., 630 Fifth Ave., New York 20, N. Y. Among the data presented in this booklet is a listing of capacity and recommendations for gear units, a Sinclair general automotive lubrication chart, and a Sinclair preventive maintenance chart. The manual measures 4 x 9 inches and has a hole punched in it so that it can be hung by a string in a convenient location.

The booklet contains a key to Sinclair products, listing standard and heavy-duty oils, transmission and differential lubricants, and other Sinclair products. It presents information on amounts and grades of lubricants required for the engine, transmission, and differential; it also lists the capacities of these parts as well as of the cooling system and fuel tank.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 44.

Efficient: easily-seen, spring-mounted convex panels cushion and deflect blows.
Quick Installation: panels cut to convenient lengths, wide-spread posts.
Economical: reasonable initial cost, easily installed, long life.
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15,000 V. P. M. IN CONCRETE

with FLEXIBLE SHAFT SPEED OF ONLY 3,600 R. P. M.

This amazing step-up in frequency of the vibrator head is made possible by a patented, non-eccentric rotor device found only in Vibro-Plus "Rollgear" vibrators.

50% higher frequency guaranteed—Low speed flexible shaft

- save as much as a bag of cement per cu. yd.
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- less mechanical wear and tear
- longer unit life

No time is lost for periodic stripping down. The flexible shaft can be lubricated in less than 20 seconds. *The Vibrator Head Runs Dry.* No clamping or screwing needed at the power source.

"Rollgear" is designed and built for long, uninterrupted work periods.

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Internal and External Vibrating Equipment
243 West 55th Street
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U. S. SECURITY BONDS are a good investment
BUY THEM REGULARLY

A telescoping support on this 3-wheel hand truck—the Tri-Truck—adjusts and locks in the correct balance position for any type of load and any weight.

Balanced Hand Truck

A 3-wheel hand truck is announced by the Melooz Mfg. Co., 4730 Avalon Blvd., Los Angeles 11, Calif. Feature of the Tri-Truck is its telescoping support designed to adjust and lock in the correct balance position for any type of load and for any weight. The manufacturer explains that the truck will keep the load balanced on any surface whether rough, wet, or slippery.

The Tri-Truck has two rubber-tired roller-bearing wheels, 10 inches in diameter, and a free-swiveling ball-bearing hard-rubber caster. It stands 56 inches high. The telescoping support is constructed of Shelby tubing and ribbed welded steel. According to the manufacturer, the Tri-Truck can be tilted and locked in a wide range of positions from vertical to horizontal.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 106.

Aluminum Scaffolds

Upright scaffolding made of a lightweight aluminum alloy is announced by the Up-Right Scaffolds, 1013 Pardee St., Berkeley, Calif. The Up-Right scaffolds feature ease and speed of erection, mobility, and adjustability of the legs. A safety-tread stairway permits the user to mount the scaffold entirely within the structure.

A special lock-in feature is designed to eliminate the need for wing nuts, bolts, and loose parts, or for wrenches in erecting the scaffold. Each section folds flat when not in use. A foundation area measuring 4½ x 6 feet is standard, with an outboard support available to provide a 10 x 10-foot foundation area, if desired. The Up-Right scaffolds are available in any number of section units.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 7.

Wood Standards Compiled

A manual of standards for treated wood has been put out by the American Wood-Preservers' Association, 1427 Eye St., N. W., Washington 5, D. C. This engineering guide contains the latest material available as adopted at the April meeting of the association. It contains condensed information on the essential details of interest to designer, architect, contractor, specification writer, or other consumer or producer of treated ties, poles, piles, lumber, and other wood products.

The book is 150 pages long and is bound in a black fabric-like ring binder. Celluloid guide tabs divide it into four main divisions dealing with preservatives, treatments, methods of analysis, and recommended practices. As new standards or revisions are adopted they can be inserted in the manual.

The AWPA is a group devoted to furthering the production and use of treated wood. Membership applications and copies of the manual may be obtained by writing to the Association's office. Cost of the manual is $5.00.

Steam-Cleaning Unit Runs on Electricity

A portable all-electric steam-cleaning unit adapted for use on construction equipment is manufactured by the Livingstone Engineering Co., Dept. 33, 100 Grove St., Worcester 5, Mass. The Speedylectric Steam-Jet cleaner has a boiler capacity of 28 kw and runs on a single or polyphase ac circuit with a voltage of 220 or higher. The all-steel dolly has ball-bearing rubber-tired swivel casters to simplify moving the machine. The manufacturer states that the Speedylectric can be used wherever there is a source of current and a water line.

Steam is delivered to the cleaning nozzle where, under fingertip control, it picks up the soap solution, solvent, or detergent. This is atomized with the high-pressure steam as it impinges at jet velocity on the surface to be cleaned. The pressure tank is designed to assure a positive flow of detergent or solvent to the nozzle at desired rates and pressures. The unit requires a floor space measuring 26 x 42 inches. It weighs about 400 pounds.

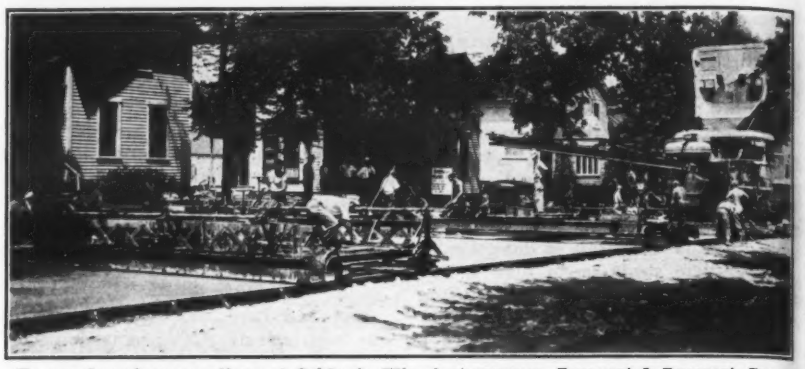
Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 55.

Engineers Study Corrosion

The National Association of Corrosion Engineers is a non-profit technical group whose aim is to do something about the large losses which occur annually through the action of corrosion. The Association was formed in 1944 and consists at the present time of 1,800 active members and 240 company members.

The NACE promotes the pooling, evaluation and dissemination of knowledge about corrosion; organizes committees to study it; attempts to increase the efficiency of various technical societies concerned with corrosion by reducing duplication among them; sponsors regional and other meetings for the open discussion of corrosion problems; and seeks to deal with it in still other ways.

The NACE publishes a journal called "Corrosion", which contains important technical articles on the subject, abstracts of current articles, and news of the field. The NACE also sponsors the publication and distribution of important papers which are brought out on the subject of corrosion. Further information on the organization, its aims, membership requirements, and so forth, can be obtained by writing to the National Headquarters at 711 Main St., Houston, Texas.



To speed paving operations at Oshkosh, Wis., last summer, Lampert & Lampert, Inc., used this Flex-Plane combination screed and joint-installing machine. It cut longitudinal and transverse joints and re-screeded the concrete in accordance with Wisconsin state specifications. Working in front of it was a Flex-Plane Panama type of finishing machine with a 20-inch-wide sectional screed.

You Can Do More WITH A MallSaw
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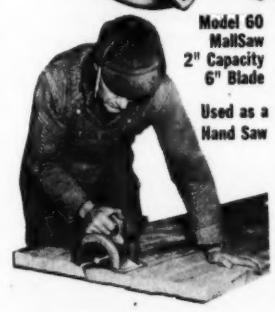
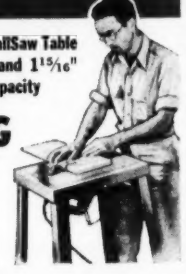


Model 60 MallSaw 2" Capacity 6" Blade Used as a Hand Saw



MallSaw Table Stand 1 15/16" Capacity

- SAWING
- WIRE BRUSHING
- SANDING
- GRINDING
- SHAPING

This one tool with its companion all-metal table stand, complete with miter guide and rip fence, equips you with a hand saw and table saw that will cut everything from wood to steel. Other interchangeable accessories convert the Model 60 MallSaw quickly and easily into a shaper . . . face or drum sander . . . wire brush . . . or grinder, thereby giving many-tool efficiency at minimum cost. 3 larger MallSaws are available with 2¼", 2⅜" and 4½" capacities.

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BURCH "Tilt-lev" with an Auxiliary Blade

- Especially adapted for shoulder work on hard surface roads. Smaller blade (also hydraulic-controlled from cab) brings in sufficient materials to help fill in low places. Larger blade clears material from hard surface.

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BURCH "Snow-Flo" Plows

- Illustrated is one of the many BURCH plow and wing combinations designed to hitch onto all trucks and tractors. Speedy, efficient snow removal. Order now!

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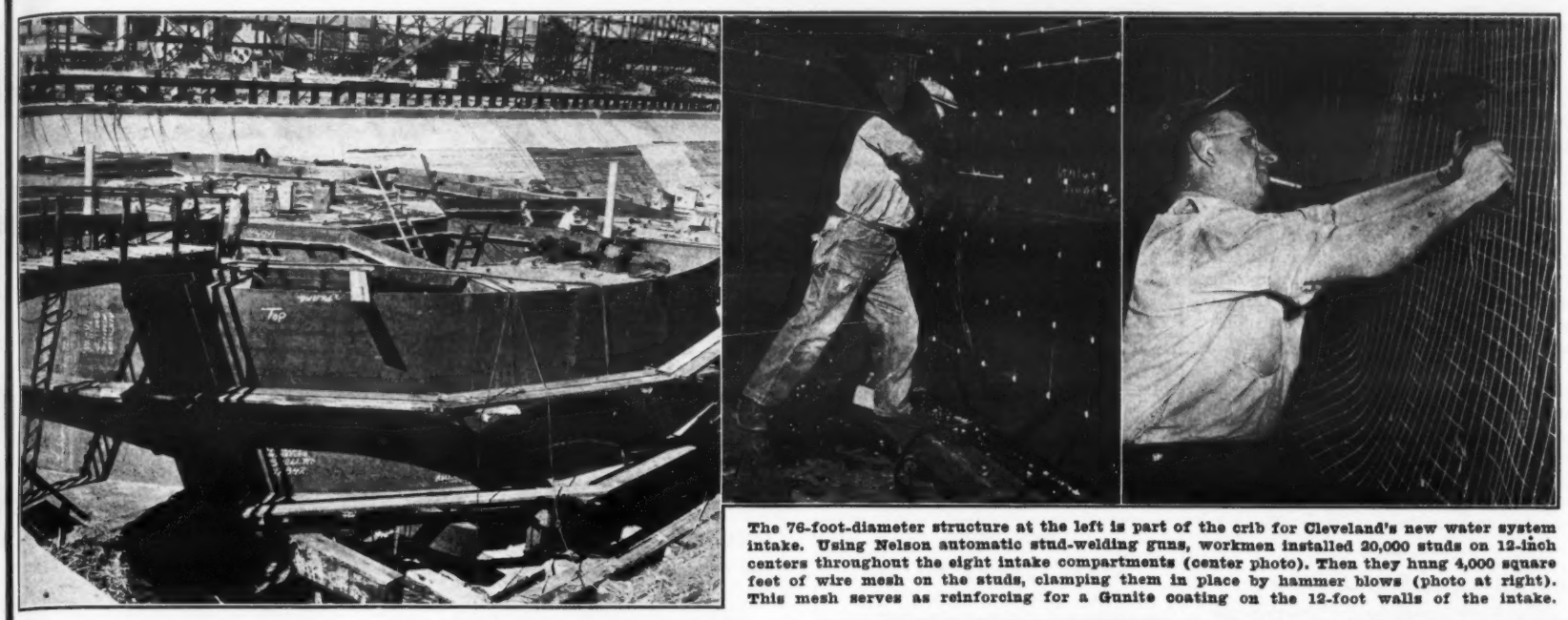

The 76-foot-diameter structure at the left is part of the crib for Cleveland's new water system intake. Using Nelson automatic stud-welding guns, workmen installed 20,000 studs on 12-inch centers throughout the eight intake compartments (center photo). Then they hung 4,000 square feet of wire mesh on the studs, clamping them in place by hammer blows (photo at right). This mesh serves as reinforcing for a Gunite coating on the 12-foot walls of the intake.

Reinforcing Speeded By Stud-Welding Gun

Speedy erection of wire-mesh reinforcing marked the fabrication of a crib for use in Cleveland, Ohio's, new water system. This crib for the new Nottingham intake was fabricated at the Lorain, Ohio, yards of the American Ship Building Co. The wire-mesh operations were speeded by installing studs—on which the reinforcing was hung—with Nelson stud-welding guns.

The intake is 76 feet in diameter and 12 feet in height. It is composed of eight compartments whose walls have a protective Gunite lining. Reinforcing for this protective lining called for 4,000 square feet of wire mesh and 20,000 studs. The studs were installed on 12-inch centers throughout the eight compartments. The wire mesh was slipped over these slotted studs and clamped in place by hammer blows. With this procedure, a 4-man crew—two with Nelson guns and two handling the wire mesh—was able to complete the 2,000 studs and 500 square feet of mesh required for each compartment in a period of 16 hours.

Data on Speed Governors

A road-speed governor for use on trucks and other automotive equipment is described in a bulletin distributed by The Pierce Governor Co., Inc., 1611 Ohio Ave., Anderson, Ind. The Pierce governor works on the flyball principle and is controlled by the speed of the wheels. This permits the engine to reach its peak efficiency in climbing hills, and under other loads, without restriction from the governor.

The bulletin shows how the governor is attached to a throttle box designed for the manifold throat of the engine on which it is installed. It shows how the spinning weights are balanced against the tension of a compression spring; how this tension is advanced or released by a set screw; how the flexible shaft connects to the speedometer drive gear in the transmission; and other features. It also shows how the unit is protected against unauthorized adjustment.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 93.

Allied Tractor Equipment

A 4-page folder about the Carco line of tractor equipment has been prepared by the Pacific Car & Foundry Co. of Renton, Wash. Among the items it lists are six models of tractor winches, three models of tractor hoists, the Carco straight-blade Cabledozer, and the Carco angle-blade Hydradozer.

Winches listed are the Model S for use on tractors up to 45 hp, the Model E for tractors up to 50 hp, the Model F for tractors up to 75 hp, the Model G for tractors up to 105 hp, and the Model J for tractors up to 160 hp. The Model SG for 15 to 30-hp tractors is featured in a special insert. The Model R hoist which is listed is designed for use with tractors up to 70 hp, the Model T for tractors up to 105 hp, and the Model K for tractors up to 175 hp.

Each of these winches, hoists, and blades is illustrated in the catalog. General features and specifications are listed, as are many special features of operation or maintenance. The back page of the catalog shows photographs of the various pieces of Carco tractor equipment in use on a variety of construction projects.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 84.

County Does Ditch Clearing Cost-Free

Decatur County in Indiana delivers the dirt removed from highway shoulders and ditches to farmers and property owners who want it. Not only does it solve its dirt-disposal problem this way, and accommodate its citizens, but by making a reasonable service charge per truckload of dirt it expected to pay in 30 days for the loader it purchased recently.

Everett Lanham, Decatur County Surveyor and Highway Supervisor, reported on this dirt service at the Purdue Road School, apropos of discussions about proper highway drainage. The average county, with 700 or 800 miles of roads, can keep ditches open satisfactorily with a motor grader, he maintained. But the real problem is what to do with the dirt after it is pulled out.

Decatur County, for example, uses a Caterpillar 60-hp tractor and Adams grader to pull dirt up from the ditches onto the shoulders. In 1943 it purchased a White front-end loader on a Case tractor for loading both dirt and stone from stockpiles. But though the loader does good work, Mr. Lanham explained, it can't handle all the dirt that keeps filling up ditches in a county like Decatur, which has a lot of rolling land and a quick run-off of water.

Accordingly, last August the County purchased an Athey Force-Feed Loader and began using 5 to 8 trucks to haul the dirt to farmers and property owners who wanted it. The regular county crew handled the dirt removal when other work wasn't too pressing.

The charge per load ranged from $1.00 to $1.10, depending on the length of haul, and as many as 419 loads were delivered to one customer. The County delivered 4,600 loads last year during August and until weather conditions prevented ditching work. When Mr. Lanham made his report, there were enough orders ahead for dirt service this year to last a long time. The County uses all the dirt it needs to widen fills before it trucks any away, Mr. Lanham pointed out. But since it gets from 75 to 150 loads a mile, it has far more than it can use.

Mr. Lanham said the County expected to sell enough dirt service in 30 days this year to pay for the loader it purchased. He also pointed out that the County's work of removing high shoulders and opening ditches has brought a great deal of favorable comment from people of the county and from outsiders who travel the roads that have been worked.

Jobs Done Quicker, Cheaper

Attached to Tractors, Bulldozers, Motor Graders and Scrapers, the Automatic Slope-Meters are in use on the construction of highways, airports, dams and building sites. Slope-Meters are compact, sturdily constructed instruments that will automatically show the operator the exact grade or slope on which he is working.

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RAINCAP

STOPS MOISTURE FROM FALLING INTO TRACTOR EXHAUST . . . Just slip the "RAINCAP" over the open end of your tractor exhaust, and you eliminate forever the danger of moisture falling into the exhaust, injuring your tractor.

THE CAP THAT DOES NOT FORGET TO CLOSE . . . Completely automatic—the "RAINCAP" is counter-balanced to open when the tractor starts and close when it stops. Rust proof—made of cast aluminum with bronze bushing—can be installed in two minutes. F.O.B. Waterloo, Iowa.

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No.	O.D. Exhaust	Retail
1	2 1/8"	$1.90
2	2 3/8"	1.90
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5	1 7/8"	1.90
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5x	1 3/4"	1.90
6	1 1/2"	1.90
66	1 3/8"	1.90
7	2 1/2"	1.90
8	3"	2.50
9	3 1/8"	2.50
10	3 1/4"	2.50
11	3 1/2"	2.75
115	3 3/4"	3.00
12	4"	3.00
123	4 1/8"	3.00
125	4 1/4"	3.00
14	4 1/2"	3.00

WATERLOO FOUNDRY CO., WATERLOO, IOWA

Quick-Drying Paint For Traffic Stripes

A new traffic paint based on a synthetic resin and chlorinated rubber is long-lasting and rapid-drying, says Hercules Powder Co., 915 King St., Wilmington, Dela.

According to Hercules, it will dry in from 11 to 20 minutes, depending on such factors as thickness of film and type of solvent. And on tests conducted on road surfaces it is said to have shown satisfactory wearing qualities. It can be used with conventional types of traffic-marking equipment.

The synthetic resin, Pentalyn 802A, is described as a phenolic-modified pentaerythritol ester of rosin. The chlorinated rubber is a patented Hercules product known as Parlon.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 52.

Legality and Pitfalls Of Engineering Contracts

"Engineering Contracts and Specifications" has been revised and published in a second edition by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. It is intended as a practical and authoritative guide for practicing engineers, architects, and contractors. The author is Robert W. Abbett, a partner in the New York City firm of Knappen Tippetts Abbett Engineering Co.

The book contains material and advice on construction insurance, elements of specifications, principles of specification writing, and assembling of specifications. The sections on legal considerations, competitive-bid contracts, pre-qualification of contractors, and arbitration have been thoroughly revised. Contract procedure is mapped out along the lines of private practice and, at each step, the author examines the comparative government procedure. All the material is presented from an engineering point of view.

Price of the book is $3.75. It can be obtained by writing directly to the publisher.

Papers of Texas Highway Short Course Are Printed

Papers given at the Texas 22nd Annual Short Course in Highway Engineering have been printed and issued as Bulletin No. 105 by the Texas Engineering Experiment Station of Texas A & M College. The course is a yearly activity of the College Civil Engineering Department in cooperation with the Texas Highway Department.

Three of the papers deal with air-entraining cements and air-entrained concrete. Three others discuss roadway shoulders—their functions, design and maintenance. Penetration surfaces are dealt with in four of the papers. Other subjects treated include the role of the county man in Federal-Aid secondary roads, economic factors to be considered in highway rehabilitation, suggestions for reducing construction costs, freeze damage, maintenance of structures, and progress made to date on the Houston expressways.

Bulletin No. 105 can be secured by writing to the Texas Engineering Experiment Station, Agricultural & Mechanical College of Texas, College Station, Texas. Single copies are supplied without cost.

Atlas Transfers Flippo

John F. Flippo has been transferred to the Chicago District Sales Office of the Atlas Powder Co. of Wilmington, Del., as Assistant Manager. He is succeeded as Assistant Manager of the Pittsburgh district by J. L. Wetzel, formerly Sales Representative in that area.

TRADING POST

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STEEL SHEET PILING
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1—Pumpcrete, Rex, Single 160, with 436 ft. pipeline. New April 1948, used 3 months, reconditioned and repainted July 1948.
1—Tractor, Caterpillar, RD-4, 7-ft. blade, rear power control unit, with Adams Hauling Scraper, Model 30, 3-5-yd.
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50-kw motor-generator. 100-hp Buda, Hercules or Waukesha gasoline engines unitized on portable frame with 62.5 kva, 240-volt, 60-cycle, three-phase, AC generators. Excellent condition. $1,250.00.
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Ready Mix Concrete Outfit
Two-compartment bin with scale and batcher, also two International Truck-mounted; 1½-yard capacity Jaeger Transit Mixers. Asking only $4,500.
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NEW-USED RECONDITIONED
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Index to Advertisers

Acrow, Inc. 96
Allis-Chalmers Tractor Div. 36, 37
Alloy Steel & Metals Co. 46
American Asbestos Products Co., The 10
American Conveyor Co. 97
American Hoist & Derrick Co. 44, 95
American Manganese Steel Div. 51
American Paulin System 42
American Steel Scraper Co., The 33
American Steel & Wire Co. 28, 29
Ariens Co. 53
Austin-Western Co. 22

Barber-Greene Co. 11
Benjamin's for Motors 43
Bethlehem Steel Co. 72
Bicknell Mfg. Co. 63
Blackhawk Mfg. Co. 97
Briggs & Stratton Corp. 40
Bucyrus-Erie Co. 53
Burch Corp., The 104
Butler Bin Co. 64

Caine Steel Co. 41
Carter Co., Ralph B. 94
Case Co., J. I. 89
Cataphote Corp. 72
Caterpillar Tractor Co. 80, 81
Cedarburg Mfg. Co., Inc. 8
Cemco Inc. 76
Chain Belt Co., 8
Chevrolet Motor Div., GMC 49
Chicago Pneumatic Tool Co. 61
Chrysler Corp., Industrial Engine Div. 26
C. I. T. Corp. 10
Clark, Murray A. 75
Cleveland Trencher Co., The 24
Coffing Hoist Co. 100
Complete Machinery & Equip. Co., Inc. 77
Concrete Surfacing Machinery Co. 9
Concrete Transport Mixer Co., Inc. 69
Continental Decalcomania Co. 84
Continental Rubber Works 22
Cummer & Son Co., The F. D. 101
Cummins Engine Co., Inc. 90

Dallett Co., The 16
Dart Manufacturing Co. 30
Davenport Besler Corp. 11
Detroit Diesel Engine Div., GMC 30
Dixon Valve & Coupling Co. 60
Dodge Div. of Chrysler Corp. 71
Domestic Engine & Pump Co. 92
Douglas Fir Plywood Association 14
Drake-Williams-Mount 97
Dril-Hamer Company 46
Duo-Safety Ladder Corp. 84
Duplex Truck Co. 101

Eaton Mfg. Co. 83
Electric Tamper & Equipment Co. 92
Embury Mfg. Co. 14
Ennis Supply Co. 93
Erie Steel Construction Co. 40
Etnyre & Co., E. D. 60

Fairbanks, Morse & Co. 27, 99
Flink Co., The 83
Foote Co., Inc., The 52, 68

Galion Allsteel Body Co., The 91
Gatke Corp. 95
General Lighting Products 32
GMC Truck & Coach Div. 62
Godfrey Conveyor Co. 76
Griffin Equipment Corp. 103
Griffin Wellpoint Corp. 88

Hayward Co. 26
Heltzel Steel Form & Iron Co. 34
Hendrix Manufacturing Co., Inc. 43
Hercules Steel Products Corp. 55
Hetherington & Berner Inc. 54
Hobbs Corp., John W. 79
Hodgman Rubber Co. 54
Homestead Valve Mfg. Co. 102
Hotel Strand 32
Huber Mfg. Co. 32
Hydro Spreader Corp. 66

Industrial Products Co. 16
Igloo Mfg. Co. 60
International Harvester Co. 20, 21
Iowa Manufacturing Co. 7
Irvington Form & Tank Corp. 39

Jaeger Machine Co., The 74
Jahn Co., C. R. 49
Joy Manufacturing Co. 38

Kelly-Creswell Co. 35
Kim Hotstart Mfg. Co. 42
Kinney Manufacturing Co. 100
Koehring Company 86, 87

La Crosse Trailer Corp. 25
LaPlant-Choate Manufacturing Co., Inc. 85
LeTourneau Inc., R. G. 108
Lewis-Browning Mfg. Co. 17
Littleford Bros., Inc. 99
Lubriplate Div., Fiske Bros., Refining Co. 97

Mall Tool Co. 104
Marion Machine Company 90
Marion Metal Products Co. 44
Marmon-Herrington Co., Inc. 50
Martin Machine Co. 92
Marvel Equipment Co. 98
Maxon Construction Co., Inc. 102
McCaffrey-Ruddock Tagline Corp. 64
McConnaughay, K. E. 102
McCulloch Motors Corp. 9
McKiernan-Terry Corp. 67
Mechanics Universal Joint Div. 79
Michigan Power Shovel Co. 23
Miller Research Engineers, Ray 89
Miracle Decal Co. 55
Mixermobile Manufacturers 31
Monarch Road Machinery Co. 101
Moorhead Machinery & Boiler Co. 31

Nelson Corp., Herman 98
New Holland Mfg. Co. 88
Northwestern Auto Parts Co. 67
Nostrip Div., Maguire Industries, Inc. 34

Oakite Products, Inc. 76
Oliver Corp. 82
Ort, Karl 68
Owen Bucket Co., The 56
Owen Loader Inc. 100

Pennsylvania Refining Co. 5
Porter-Cable Machine Co. 63

"Quick-Way" Truck Shovel Co. 33

Rockford Clutch Division 74
Rodgers Hydraulic, Inc. 48
Roebling's Sons Co., John A. 15
Roeth Vibrator Co. 25
Rogers Brothers Corp. 78
R.P.B. Corp. 62

Sasgen Derrick Co. 45
Schield Bantam Co., Inc. 35
Schramm Inc. 77
Seaman Motors, Inc. 47
Shaw Sales & Service Co. 45
Silver Booster Manufacturing Co. 66
Simplicity System Company, The 82
Smith Engineering Works 39
Southwest Welding & Mfg. Co. 27
Standard Oil Company of California 7
Standard Oil Company (Indiana) 75
Standard Steel Corp. 22
Sterling Machinery Corp. 61
Sterling Wheelbarrow Co. 91
Stoody Company 18, 19
Superior Decals, Inc. 71
Symons Clamp & Mfg. Co. 73
Syntron Company 78

Techkote Co., The 24
Texas Co. 3, 12, 13
Thew Shovel Co. 5
Tuthill Spring Co. 103
Twin Disc Clutch Co. 84

Unit Crane & Shovel Corp. 25
United States Motor Corp. 98
United States Rubber Co. 73
Universal Form Clamp Co. 41

Van Dorn Electric Tool Co. 57
Vibro-Plus Corp. 103
Vulcan Tool Manufacturing Co. 93

Walter Motor Truck Co. 56
Waterloo Foundry Co. 105
Waukesha Motor Company 69
Wellman Engineering Co. 99
Wenzel Tent & Duck Co., H. 57
Western Foundation Corp. 65
W.G.B. Oil Clarifier, Inc. 39
White Manufacturing Co. 48
Wisconsin Motor Corp. 74
Witte Engine Works, Div. of Oil Well Supply Co. 66
Woolery Machine Co. 51
Worthington Pump and Machinery Corp. 94

Yaun Dragline Buckets & Mfg. Plant 52

Ziegler Co., Inc., Wm. H. 105

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